The Electrical Industry's Weekly Magazine

June 13, 1960

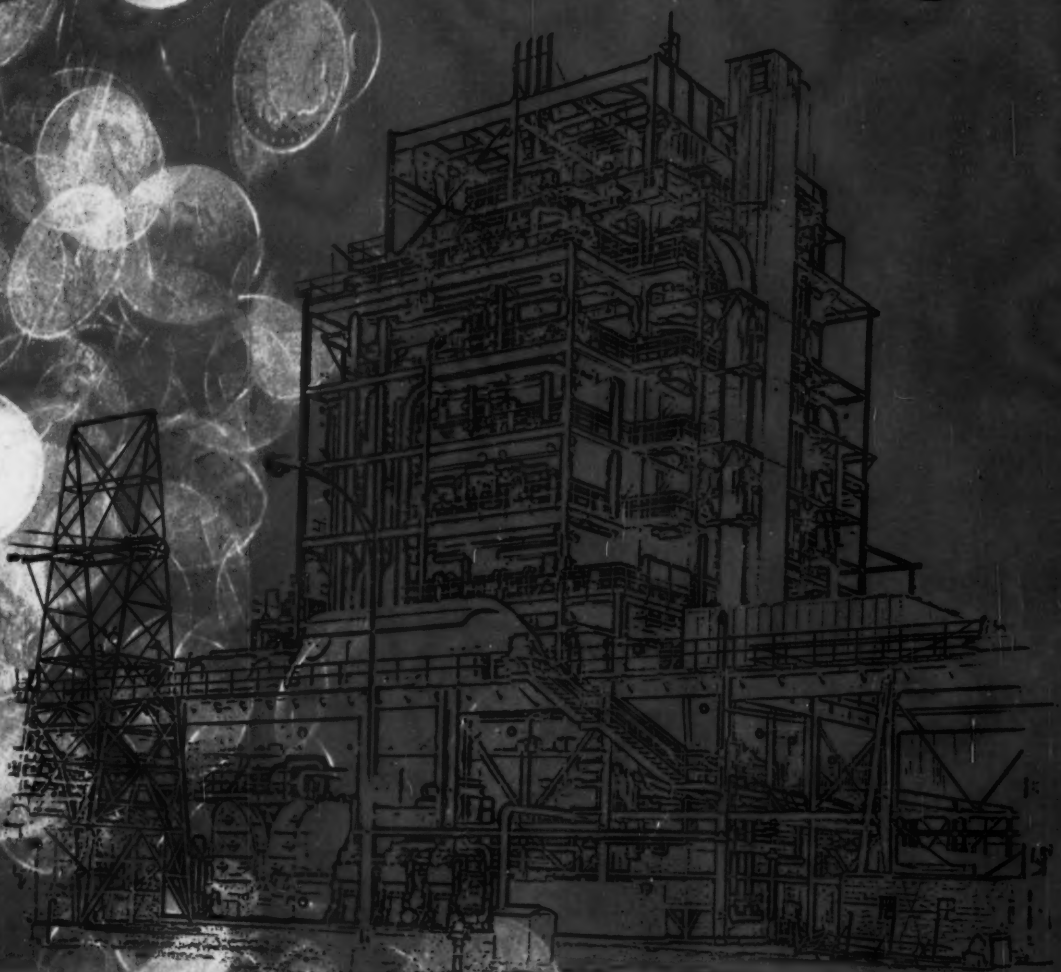
Electrical World

Price 50 Cents

A McGraw-Hill Publication

Dependable Auxiliaries Make Unit's Cost Less

...page 50



Parties, Platforms, Power, Personalities and Politics . . .

UNIV MICROFILMS INC GS
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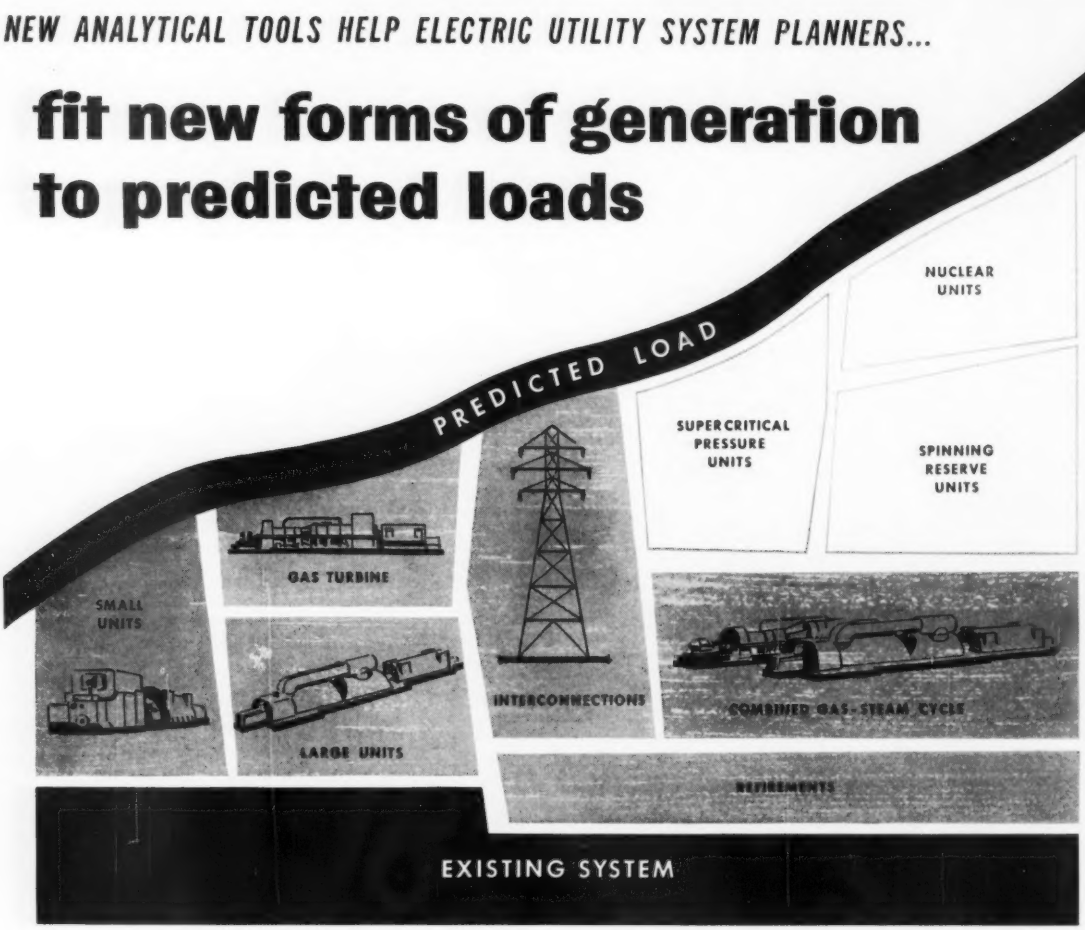
NEW ANALYTICAL TOOLS HELP ELECTRIC UTILITY SYSTEM PLANNERS...

fit new forms of generation to predicted loads



POWERFUL NEW MATHEMATICAL TECHNIQUES to analyze the type, size, location, and timing of new power generation facilities have recently been developed by General Electric engineers, working co-operatively with system planning engineers of several electric utilities. These techniques simulate, with a high degree of accuracy, the performance of future systems.

NEW FORMS OF POWER GENERATION, many of them developed by General Electric, now offer electric utilities further cost-saving possibilities. At the same time, vastly different capital-cost and fuel-cost characteristics of new units create a problem of choice. System planners who seek optimum generation expansion patterns are confronted by alternatives more numerous and more complex than ever before.

TO DEVELOP SIMPLIFYING PROCESSES that can counteract processes of complication, electric utility system planners, together with leading electrical manufacturers, have been working to develop more effective analytical tools.

General Electric's new technique, using high-speed digital computers, is the most comprehensive method now available for arriving at accurate cost models of future power generation patterns:

- Units are scheduled on an equal incremental cost basis.
- The computer model accurately represents hourly load variations throughout the period under study.
- Daily load cycles being simulated are continuously modified to accord with days of the week, seasons of the year, and long-term growth trends.
- Units are started and stopped to meet spinning reserve requirements.
- Maintenance is done on the constant-risk principle.

CO-OPERATIVE PLANNING SUPPORT is available to your company. Contact your nearest General Electric Apparatus Sales Office for more information. For a copy of GER-1680, "Computers Aid System Generation Planning," write to the General Electric Company, Section 604-03, Schenectady 5, N. Y.

GENERAL ELECTRIC

Electrical World

Vol. 153, No. 24 JUNE 13, 1960

Published for 86 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue

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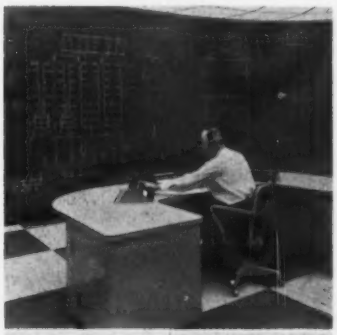

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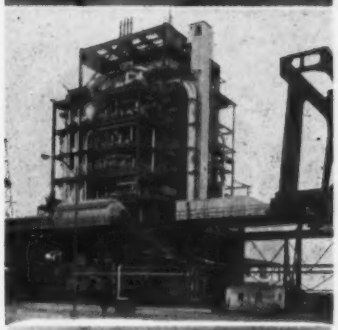

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Giant Control Center Installed

Largest system control center in US is placed in service by Public Service & Gas Co for present and future needs.....p 48

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Service to Trailers Can Be Underground

E. C. De Baene, Detroit Edison Co

Park owners make choice, but selection of underground involves paying costs of trenching and backfilling.....p 54

GENERATION

Reheat Plant Costs $93 per Kw

W. H. McAlpin, Dallas Power & Light Co

Automatic controls saves on personnel, outdoor construction, dispensing with standby feed pump add economies...p 50

SUBSTATIONS

Design Permits Substation to Grow

R. E. Albrecht, R. R. Blanchard, H. G. Darren, Consumer Power Co

Planned steps reduce investment losses—estimated savings amounting to $100,000 per completed substation.....p 56

TRANSMISSION

Tailored 'Boat' Lays Cable Gently, Fast

Joegen Joergensen, Copenhagen, Denmark

Floating drum transports, lays submarine cable for crossing Danish fjord .....p 52

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GUIDED, POWER-FED AUGER GUARANTEES STRAIGHT HOLES

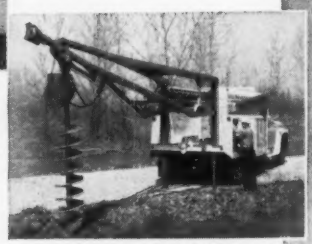
takes only two controls to put it through its paces

Simplicity of operation is the big difference between the Series EM-2 "Earth-Master" and ordinary hydraulic diggers which require movement of three or four levers to dig a hole of comparable size. Unlike diggers that depend on the derrick for down pressure, the frame-guided EM-2 provides direct digger control — with full power down feed exerting several thousand pounds of pressure. Auger can be reversed, run at low speed for digging or at high speed for spin-off. Installed on a live-boom derrick like the Series PM-20 "Pole-Master" shown, this portable unit provides the power and operating features of a fixed-position digger.

Digger and derrick are hydraulically powered . . . controlled independently to permit digging while pole is suspended, an especially valuable feature where cave-in is possible. Pole can be set just as soon as the hole is dug.

Twin-column telescopic frame, which stows out of the way when derrick is needed for normal hoisting, also serves as a ground prop for pole-pulling and for increased derrick capacity.

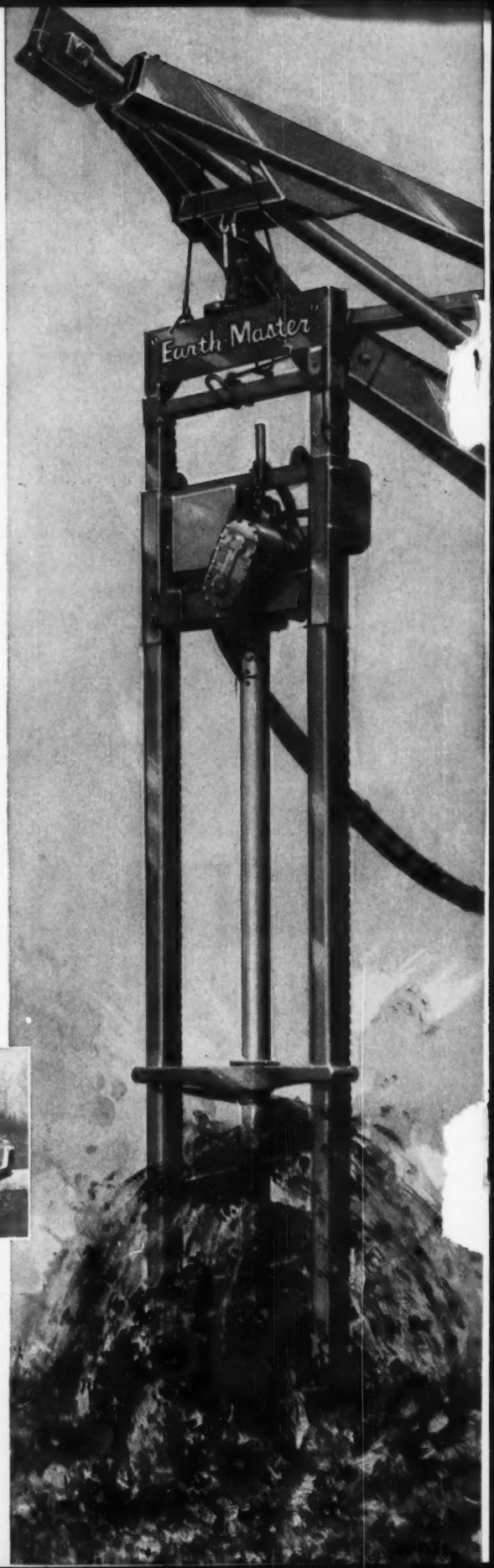
SERIES EM-2 "Earth-Master" Hydraulic Hole Digger
DIGS VERTICALLY OR AT ANGLES . . . FROM 9" TO 30" IN DIAMETER, UP TO 10' 6" IN DEPTH



SERIES DF-1 *"Earth-Master"* Hydraulically-powered . . . digs to 10'6" deep, 9" to 20" in diameter. Shown above on a Series PM-10 "Pole-Master" Derrick.

another reason why
UTILITIES EXPECT MORE FROM

POWERS American



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LETTERS

Defends Sodium Reactors

To the Editor:

The May 16, 1960, issue of Electrical World contained, in the Fifth Nuclear Power Report, some statements concerning the sodium graphite reactor. In particular it is stated that "in the Atomic Energy Commission's view, it is unlikely that the potential of sodium-cooled thermal reactors will be achieved as soon, for example, as sodium-cooled fast breeder plants."

A careful review of AEC publications does not support this statement. Neither do the studies which have been prepared for the AEC concerning the development potential of this concept. Fuel cycle costs for similar fuels are inherently cheaper in a thermal reactor than in a fast reactor, due to the lower enrichment required, and even with plutonium credit for breeders it appears that cost of power from thermal sodium-cooled reactors is less expensive than from fast breeders with fuel burnups presently available.

The advantage of fast breeders is, of course, future conservation of fertile metals, for which no immediate requirement appears to exist. It is also possible that very high burnup fuel can be developed to reduce fast reactor fuel cost. In the meantime, thermal reactors appear to be the most economical producers of the sodium-cooled type.

I should like to note also that, while providing nuclear superheat is a development objective of most of the reactor types being studied, sodium-cooled reactors such as SRE and EBR-I have been producing superheated steam for a number of years. In fact, the SRE has produced, on occasion, 600 psi steam at 1000F.

R. W. Dickinson, director
Sodium Reactors Dept
Atomics International
Canoga Park, Calif.

'Wee People' Are Popular

To the Reader:

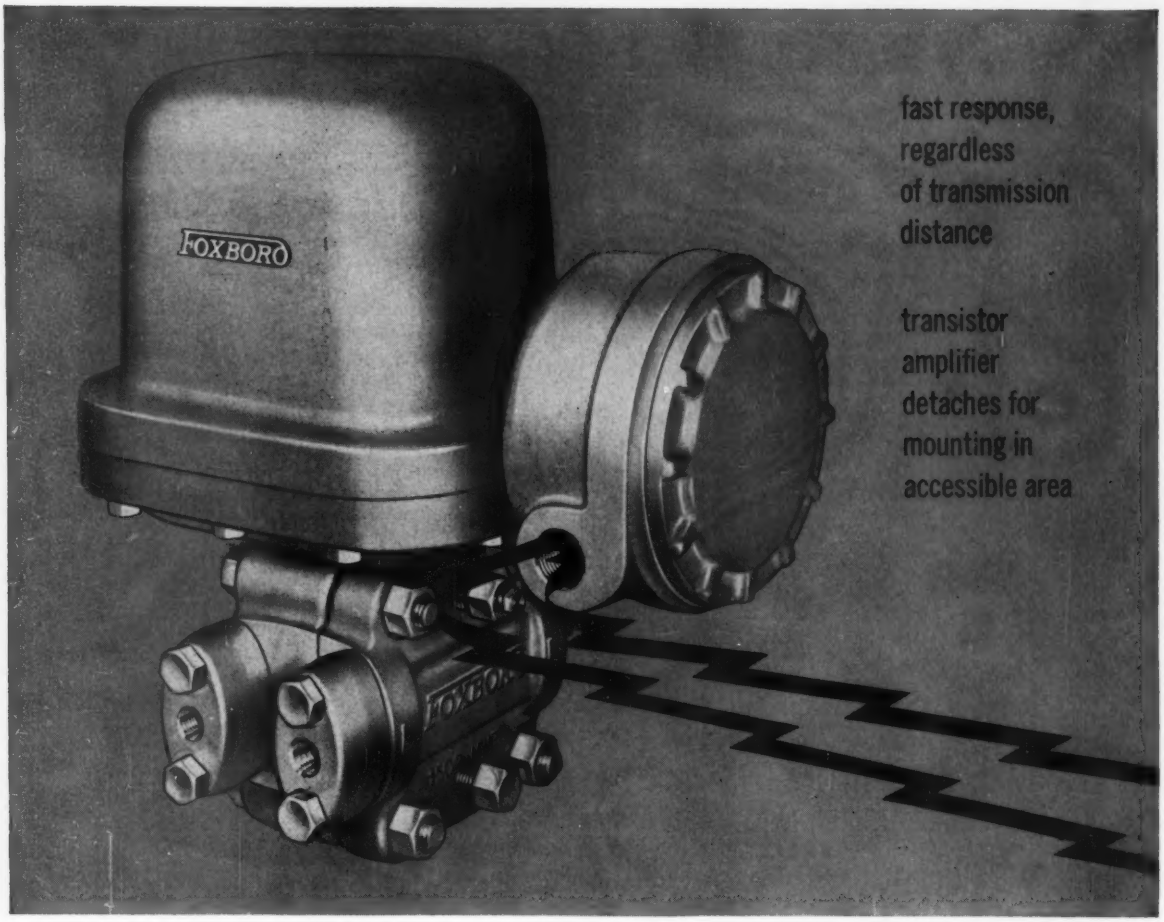
In our Oct. 19, 1959, issue we carried in this column a delightful little story of how the "wee people" in Ireland tried to prevent a new power line from being constructed.

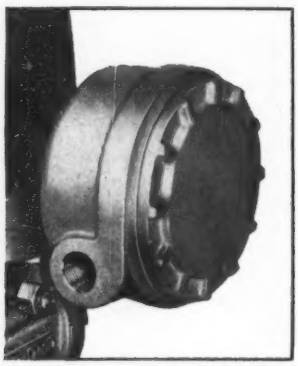
We thought you might like to know that this story has been carried in a number of utility house publications and other papers and we are still getting requests for permission to reprint. The "wee people" are very popular.

The Editors

This column is your forum in Electrical World. Your comments, observations, or questions are encouraged. It is sometimes necessary to edit letters for space reasons, but we endeavor to be faithful in preserving your viewpoint. Address correspondence to "Letters Editor," Electrical World, 330 W 42nd St, New York 36, N. Y.

introducing the Foxboro electronic d/p cell* transmitter


FOXBORO
fast response, regardless of transmission distance
transistor amplifier detaches for mounting in accessible area



Transistor amplifier of the Foxboro Electronic d/p Cell can be detached for relocation in an accessible area, so that all transistors are removed from possible contamination. Separate mounting has absolutely no effect on accurate measurement and transmission.

Yes, Foxboro has taken its famous pneumatic d/p cell transmitter and added to it the benefits of electronic transmission. Look at the results:

- true force-balance design for lowest displacement — fastest response
- solid state throughout — no vacuum tubes to replace
- pressure, flow, and level transmission up to several miles without lag
- same body, same performance as thousands of pneumatic d/p cells now in operation
- ranges from 5 to 850" of water — maximum working pressures to 6000 psi

And then, of course, you get the same positive overrange protection, the same high sustained accuracy, the same rugged construction that has always been standard with the Foxboro d/p cell transmitter.

Foxboro electronic d/p Cells are presently in use measuring and transmitting: pressurizer level, primary coolant flow, and steam generator 3-element feed-water level and flow. For full details on this important unit in the Foxboro Electronic Consotrol* family, get in touch with your Foxboro Field Engineer. Or write for Bulletin 21-10. The Foxboro Company, 246 Norfolk Street, Foxboro, Mass.

Reg. U. S. Pat. Off.

FOXBORO
REG. U. S. PAT. OFF.

You can save money on bookkeeping time with Graybar as your auxiliary warehouse

At least half of stores' transactions cover items costing under a dollar. So it's easy to see how total bookkeeping time can be topheavy.

However, when you make Graybar your auxiliary warehouse for electrical equipment and supplies, you open possibilities for savings. An increase in the number of items on the Graybar order, can save you time in writing orders and in processing them. So can the blanket order for a specified period. Other measures save at inventory and auditing time.

Start with a local call . . . Let the Graybar man come in, study your system, and submit recommendations. You'll find it worthwhile.

Employee-owned Graybar, a part of your local community, has served utilities continuously since the first lines went up. Whether you require 3 items or 3,000, Graybar is your most practical source for most electrical utility equipment and supplies.

When Graybar is your auxiliary warehouse—

- You save on storeroom costs
- Reduce inventory investment
- Insure prompt delivery
- Step up manhour efficiency
- Simplify bookkeeping

933

GraybaR

ELECTRIC COMPANY, INC.

420 Lexington Avenue, New York 17, N. Y.

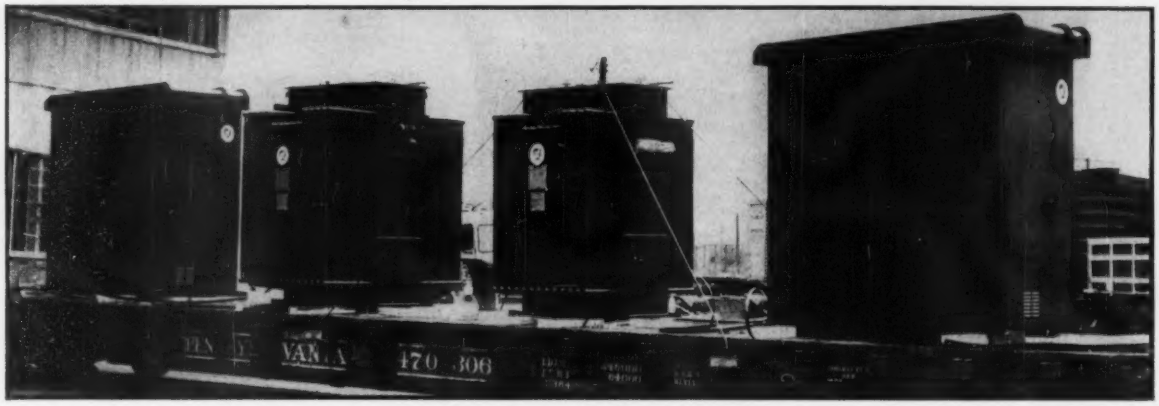
Everything Electrical GraybaR ELECTRIC COMPANY

IN OVER 130 PRINCIPAL CITIES

LOCAL SERVICE TO UTILITIES THROUGH COAST-TO-COAST WAREHOUSING

Pennsylvania Transformer Announces a Complete Line of SECONDARY

All Components Designed and Manufactured Under One Roof

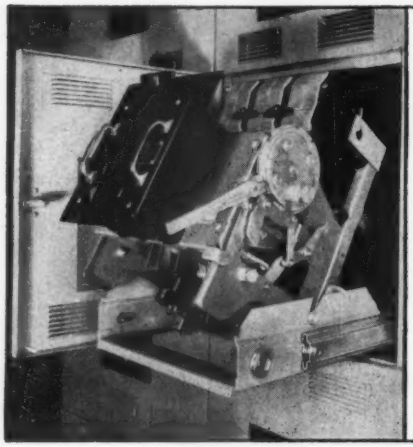


Coordinated shipment of all substation components is the practice at Pennsylvania Transformer. Switchgear assemblies and transformers are produced at the same plant.

Tilt-back Feature Facilitates Inspection and Maintenance

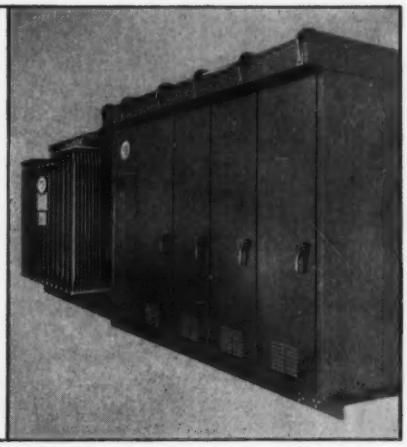
A unique feature of Pennsylvania's drawout switchgear allows the breaker to be tilted back when in the withdrawn position. This is particularly important for maintenance and the adjustment of trip elements.

The racking mechanism is operated with a self-storing captive handle. Before it can be operated, the mechanism must be unlatched with a lever that can be moved only with the breaker open. The mechanism locks in all positions. The compartment door can be closed with the breaker in any position.



◀ Breaker shown in withdrawn and tilted back position for easy access to trip units.

Outdoor articulated Pennsylvania substation with oil-filled transformer. Substation is rated 1500 kva, 12,470-480Y/277 volts. ▶



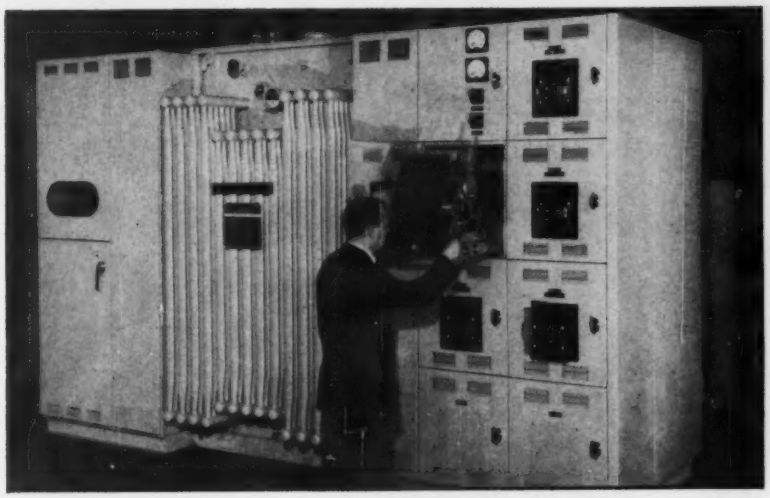
McGRAW EDISON

PENNSYLVANIA

Designed and manufactured by Pennsylvania Transformer

UNIT SUBSTATIONS

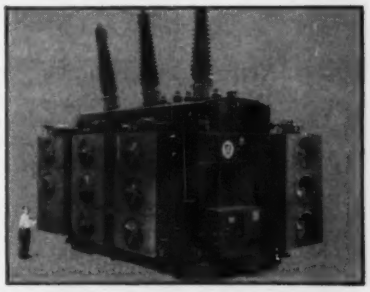
- **Centralized Responsibility Assures Coordinated Shipment of Components, Easier Installation.**
- **Products Include Indoor and Outdoor Substations —Articulated and Integrated.**
- **All Substation Components Designed in a Separate, New Department, by an Experienced Staff of Switchgear and Transformer Engineers.**
- **Low Voltage Switchgear Manufactured in New Facilities Adjacent to Transformer Plant.**
- **Pennsylvania Assumes Complete Responsibility For Materials, Workmanship and Operation of Complete Unit Substations. Perfect Fit and Matching Appearance of Components Guaranteed.**



Pennsylvania Transformer's new line of secondary unit substations includes both indoor and outdoor designs. Pictured is a 1000-kva articulated, indoor substation rated 4160-480Y/277 volts. The substation includes a primary, fused, air-interrupter switch, an askarel-filled transformer, and secondary drawout switchgear with a feature that allows the breaker to be tilted back for inspection and maintenance.

Pennsylvania... Builder of Load Center Transformers for Many Years

Pennsylvania Transformer enters the secondary unit substation field with a background of over 30 years' experience in designing and building distribution, power and load center transformers for America's leading utilities and industrials.



315,000-KVA
power transformer manufactured by Pennsylvania Transformer Division for a large midwestern utility.

Write for Copy of Pennsylvania's Secondary Unit Substation Book

This well-illustrated 44-page booklet, No. PSG 559, contains descriptions of secondary unit substation and switchgear components, as well as application data. Write for a copy on your company letterhead.

UNIT SUBSTATIONS

Division, McGraw-Edison Company, Canonsburg, Pa., Greater Pittsburgh District

A-B QUALITY

ALLEN-BRADLEY
Solenoid Starters give

MORE MILLIONS OF TROUBLE FREE OPERATIONS

. . . and for good reasons

• ONE MOVING PART
With this simple solenoid design, there's virtually nothing to go wrong—all trouble-causing bearings, pivots, and flexible jumpers have been eliminated.

• DOUBLE BREAK, SILVER ALLOY CONTACTS
Allen-Bradley silver alloy contacts never require maintenance. They are always in perfect operating condition . . . and remain so until completely worn away.

• SIMPLE UP-AND-DOWN MOTION
The virtually frictionless, straight line vertical motion provides uniform contact pressure at all times—and assures consistent, rapid operation of the contactor.

• RELIABLE OVERLOAD PROTECTION
All A-B starters are equipped with two permanently accurate and reliable overload relays that protect motors against "burnouts." Three overload relays can be furnished.

BULLETIN 709 STARTERS are made in 9 sizes from Size 0 (at left) up to Size 8.

BULLETIN 709 SIZE 7 with maximum ratings of 300 hp, 220 v; 600 hp, 440-550 v.

ALLEN-BRADLEY

QUALITY MOTOR CONTROL

Allen-Bradley Co., 1323 S. First St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

Hot reheat pipe of new 325,000 KW unit No. 5 at Pacific Gas and Electric Company's Pittsburg Power Plant in California, showing line-up of 3 Grinnell Constant Support Hangers.

Grinnell Hangers support piping at Pittsburg Power Plant

Grinnell manufactures a complete line of engineered pipe hangers and supports. Where reactive forces at terminal points must be kept within specified limits, Grinnell Constant Support Hangers are recommended. They are designed to provide an exact supporting force equal to the pipe load throughout the entire range of travel.

When pipe lines are subject to vertical movement and restrictive conditions do not require the use of a constant support type, Grinnell Variable Spring Hangers are recommended. They should be designed to support not less than 85% or more than 120% of the designed load for the total travel.

When necessary to prevent abnormal movement or vibration in pipe lines, Grinnell Sway Braces of the energy-storing, instant-acting, counter force type are available.

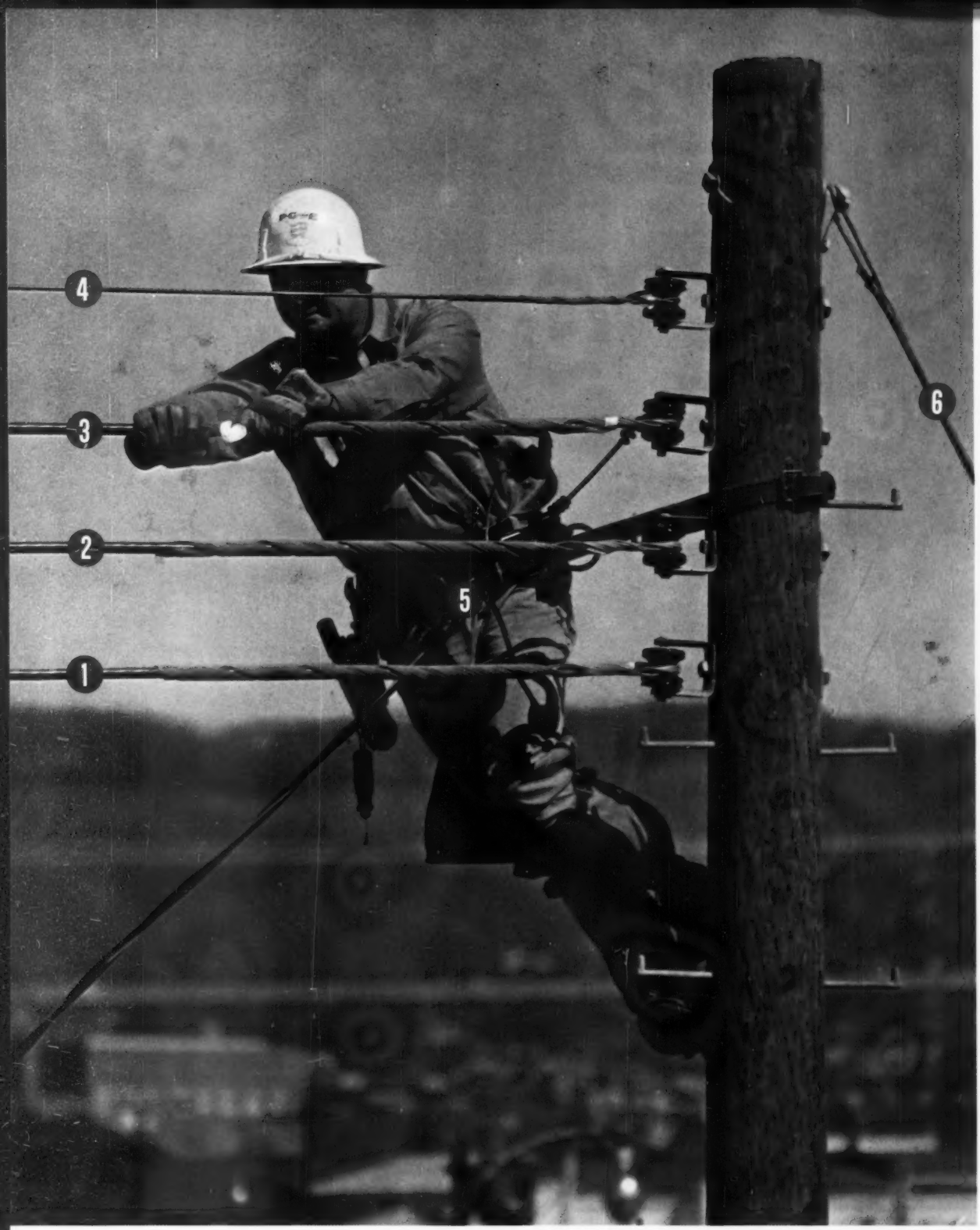
Grinnell maintains a staff of trained technicians; provides highly skilled assistance and advice right from the design stage; offers experienced field engineering service. Call on Grinnell next time. Grinnell Co., 277 West Exchange St., Providence 1, R. I.

Closeup at Grinnell Variable Spring Hanger supporting boiler feed pipe.

GRINNELL

AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

Pipe Fittings, Valves, Pipe Hangers, Prefabricated Piping, Unit Heaters and Piping Specialties
Branch Warehouses and Distributors from Coast to Coast



❶ – ❸ Preformed NADEs on secondary application—Polyethylene Covered All-Aluminum conductors, size 397.5 MCM being installed by Pacific Gas & Electric Company.

❹ Preformed NADE on Polyethylene Covered All-Aluminum street lighting circuit.

❺ Preformed Dead-End for Triplex bare neutral application.

❻ GUY-GRIP dead-end for ⅜″ galvanized steel strand.

USE *Preformed* TRADEMARK

NEOPRENE-COATED DEAD-ENDS FOR WEATHERPROOF CONDUCTORS COVERED WITH NEOPRENE OR POLYETHYLENE

With *Preformed* TRADEMARK Neoprene-Coated Dead-Ends (NADEs), the jacketing on the conductor remains intact. Labor and potential corrosion problems are reduced. No bulky fittings to be taped.

NO FEAR OF CAPACITANCE EFFECT, which can break down the covering, thereby creating NOISE; also reduce the mechanical holding strength.

NO STRIPPING OF THE COVERING, therefore **NO EXPOSURE OF THE BARED CONDUCTOR TO CORROSION** from coastal or industrial contamination.

NO DAMAGE TO CONDUCTOR JACKETING from bending the conductor around the hardware.

NO EMBEDMENT. Low localized radial pressures are distributed over wide area to develop maximum holding strength.

NO WEDGING DEVICES AND HIGH CONCENTRATED STRESSES. Groups of individual wires, bonded together with Neoprene, create bands which gently grip the conductor along the entire contact length of the *Preformed* TRADEMARK Dead-End.

Tapping to conductor tails.

ARE YOU WONDERING
HOW MANY *Preformed* TRADEMARK
NEOPRENE-COATED DEAD-ENDS
HAVE BEEN PURCHASED
DURING THE PAST THREE YEARS?

Here's The Answer:

139 ELECTRIC UTILITIES have purchased nearly 300,000

PREFORMED LINE PRODUCTS COMPANY
5349 St. Clair Avenue • Cleveland 3, Ohio
600 Hansen Way • Palo Alto, California

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Patented — U.S. Patent Number 2,761,273

The Electrical Week

LATE NEWS ▶ **Highlights at EEI's 28th Annual Convention in Atlantic City:**

• **Sherman R. Knapp is elected 1960-61 president.** The Connecticut L&P chief sees federal credit and tax inequities, urban redevelopment, and regional interconnections and power pools as three areas needing more attention. Duquesne Light Co President Philip Fleger is new EEI Vice president.

• **Convention speakers emphasize US's lead** in electric power. 1959-60 EEI President Allen King sees US capacity doubling by 1970, doubling again by 1980. Pennsylvania P&L's Charles Oakes calls for utility-manufacturer cooperation in smoothing out buying cycles, more standardization and increased power pooling.

• **L. R. Gaty elected president of nuclear group,** High Temperature Reactor Development Associates. Gaty, of Philadelphia Electric, succeeds late George Gadsby of Utah P&L.

Around the States . . . Dallas P&L offers a 5% wage increase for distribution workers; IBEW will recommend acceptance . . . Arizona PS to start building its first coal-burning station. The 110-Mw station will cost $19 million. Coal is supplied under a 35-year contract.

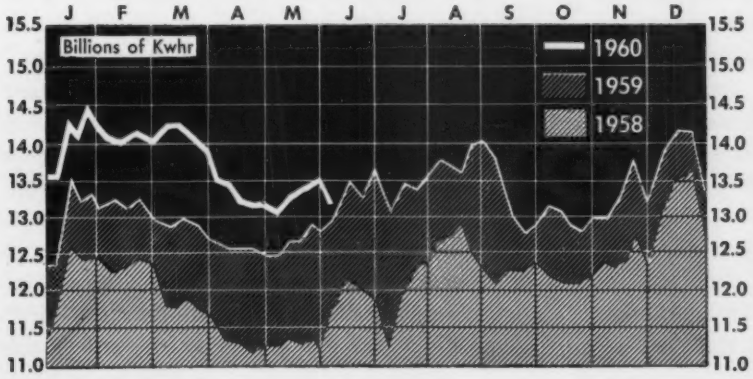
Arraignment of companies and individuals in the last set of anti-trust indictments is scheduled for 10 am, June 14.

FPC announces general revision of its uniform system of accounts for large electric companies and holders of FPC hydro licenses.

Public power group proposes 500-kv Bonneville-California tie. Pacific Coast Power Coordinating Group opposes the proposed 230-kv line.

Management changes . . . J. E. Murray elected chairman and chief executive officer of Central Illinois E&G. H. E. Brauning is new president.

*WEEKLY POWER OUTPUT**—UP 0.9% (Week ending June 4), Kwhr 13,134,000,000



Per Cent Change From Previous Year

	May 21	May 28	June 4
Total U. S.	+ 4.2	+ 6.2	+ 0.9
New Eng.	+ 3.6	+ 8.0	− 1.8
Mid. Atlan.	+ 3.2	+ 4.5	− 2.0
Cent. Ind.	+ 0.9	+ 3.3	− 4.0
West Cent.	+ 3.7	+ 7.8	+ 0.4
Southeast	+ 5.1	+ 5.9	+ 3.6
South Cent.	+ 4.5	+ 4.5	+ 7.0
Rocky Mount.	+ 7.9	+10.5	+ 7.2
Pacific			
NW	+10.6	+18.6	+ 4.2
SW	+ 7.5	+ 8.8	+ 5.7

Seasonally Adjusted Index 266.3

Week Ago 267.1 Year Ago 260.2

Source: Edison Electric Institute

*—Not directly comparable with 1959 week due to shift in Memorial Day holiday.

Preview of This Issue

EVENTS ▶ **Power policies will be decided by both parties** in the coming weeks. The powers behind the planks are named and probable contents given in a Washington report **(p 44)** . . . The first of a series of articles by **Electrical World's** Dan Braymer, currently on a European technical prospecting trip, appears this week. A two-loop system in The Netherlands is discussed **(p 46)** . . . Giant Mexico utility is being sold **(p 47)** . . . A large and flexible utility system control center is pictured and described **(p 48)** . . . More discussion on the Upper Colorado transmission plan **(p 49).**

ENGINEERING ▶ **Reheat plant cost Dallas Power & Light only $93 per kw.** Savings were achieved through automatic control, outdoor construction, and dispensing with standby feed pumps **(p 50)** . . . Cable laying across a Danish fjord was speeded through use of a special "boat" **(p 52)** . . . Trailer park owners can choose open-wire or underground distribution. If they use the latter, however, they must help pay Detroit Edison's costs for it **(p 54)** . . . Design permits Consumers Power to build substations in steps, thus reducing investment losses **(p 56).**

PROCUREMENT & PRODUCTS ▶ **Inventories are still being held down** by a broad segment of industry . . . Studies are underway to adapt fuel cells to materials handling

Politics and Public Power

'THE MORE THINGS CHANGE . . .'

There is an old French proverb which goes, "The more things change, the more they remain the same." It comes irrepressibly to mind, when reading this week's lead news story on the shape-up of the Republican and Democratic power-resources planks in their respective election campaign platforms (p 44).

For whatever else may be said about the power-resources positions of the two parties, the fact is they will contain precious little that is new. On the basis of what is known now, they sound like nothing so much as previous platforms—reworked a bit, to be sure—with an added dash of recent political spice.

This, of course, is to be expected. The stability of our two-party political system makes it so, and we may be able to take some comfort in the thought that if the parties' positions will not be new or terribly imaginative, at least they will be predictable.

Neither platform will contain a resource plank which will isolate or offend a substantial bloc of voters. Each will be framed in phrases so generalized as to appeal to (or at least confuse) the widest possible political spectrum.

The Republicans will come out in favor of the preference principle, justifying it "under the historic policy of the Congress." Under the leadership of Vice President Nixon, and probably Interior Secy Fred Seaton, they will push for joint participation by local and state governments and private enterprise in water and power development. If this sounds familiar to you, it should: It was written into the '56 GOP platform and no matter the disguise, it's still "partnership."

So far as nuclear power is concerned, the

equipment (p 68) . . . American-Standard uses modular construction on 110,000-sq-ft condenser to cut erection time at Louisiana P&L's Little Gypsy Station . . . Atomics International places reactor vessels in Hallam A-plant . . . GE installs 30-channel powerline carrier-current system for City of San Francisco (p 70) . . . Open cutout for 200-amp services vents arc-expulsion gases downward in a small cone . . . Packaged substation requires as little as 60% of the floor area of previous models . . . Oil switch rated at 400 amp withstands 13,800 amp asymmetrical, momentary current (p 74).

MANAGEMENT ▶ **Should you start an employee thrift plan?** Only a few utilities have done so, but they appear well pleased with the results. Surprisingly, the costs aren't too high, even though a company may add 50¢ to every dollar its employees contribute. For a discussion of the pros and cons of thrift plans, please turn to **page 83.**

SELLING ▶ **A "no holds barred" discussion of street lighting product problems** and a plea to put "razzle-dazzle" into commercial cooking were highlights of two recent industry meetings (p 91).

NEXT WEEK ▶ **Be sure to read EW's report on EEI's 28th Annual Convention.**

Republicans can be expected to lay heavy emphasis on the role that private enterprise should play. This, too, is in line with their 1956 position and the more recent (1959) "Percy Report," a lengthy, detailed document written by a committee under the chairmanship of Bell & Howell's youngish (39) president, Charles Percy, and aimed at streamlining the party's image. Presumably, it was undertaken with the approval of Vice President Nixon.

The Democrats also will echo the 1956 line, pledging, ". . . rapid and orderly multipurpose river basin development," and "aggressive programs to provide abundant supplies of low-cost energy."

Among other things, they will come out vigorously against "giant monopolies," attacking the Eisenhower Administration for its alleged laxity in enforcing the Holding Company Act and other anti-trust legislation.

The traditional Democratic position favoring extensive federal power development may be given impetus by the men who will be responsible for the plank. The two persons who might get that responsibility—C. Girard Davidson or Sen Ralph Yarborough of Texas—both boast long associations with the federal power movement. Davidson was a TVA attorney for several years, and Yarborough has a long association with the rural electric co-op movement, both in Texas and Washington.

So the outlook, from a power resources viewpoint, amounts to this: Both the Republicans and the Democrats are, for the most part, going to put forth the same ideas and the same programs that they have put forth in the past. The only things which will be different are the labels and the slogans . . .

"The more things change . . ."

Nuclear Notes

Union Electric of St. Louis may join in another nuclear plant project. The plant, which GE would build somewhere on the upper Mississippi, would be a superheater type of practical size for a utility system. Cost is estimated at $35 million. Union Electric, which has enough coal in its area for many more years of power generation, is considering the project because of the know-how the company could gain, as it did when it invested $2 million in the Dresden station.

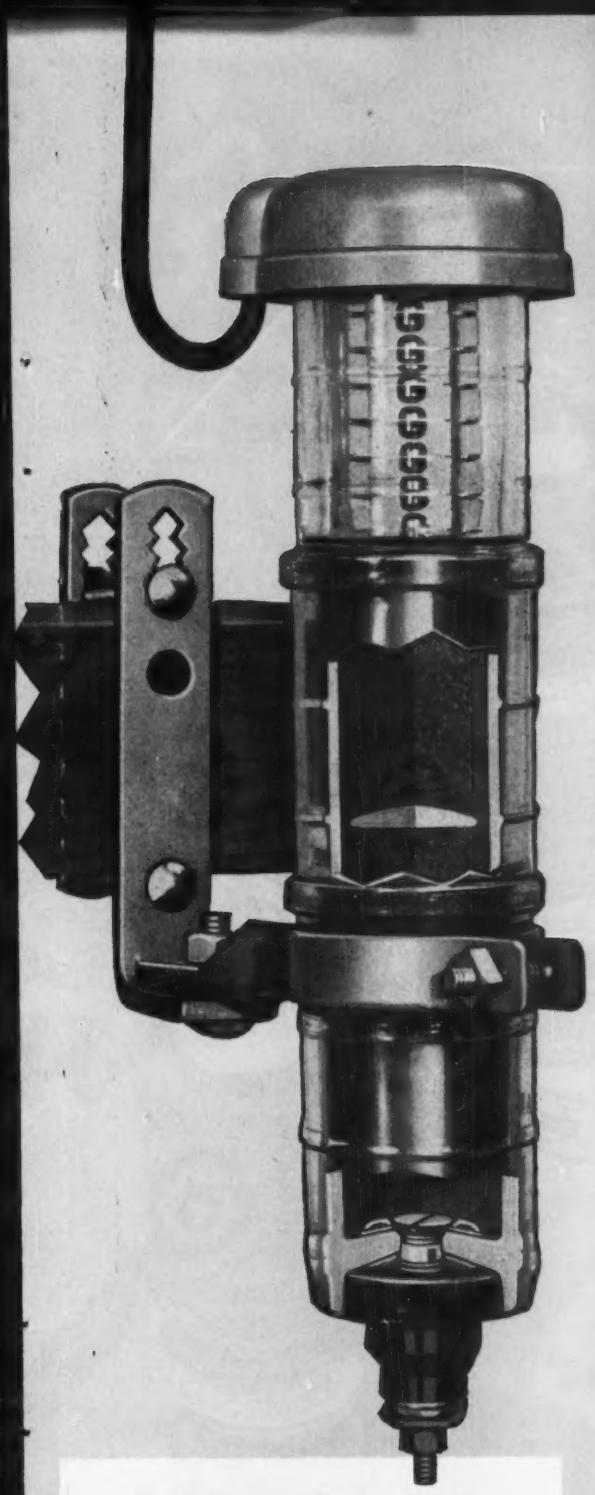
The Inner Six must have 40,000 Mw of nuclear power by 1980, Euratom president Etienne Hirsch has declared. This will come about in spite of the present surplus of fossil fuels, for energy demands of the European Community will grow by that year to 800 million tons of coal equivalent, more than the fossil fuel supply. Hirsch also called for a single executive branch to run the three Community combines—Coal and Steel Community, Euratom and the Common Market—just as there already are a unified parliament and court. He saw the unified executive as a step toward a united Europe.

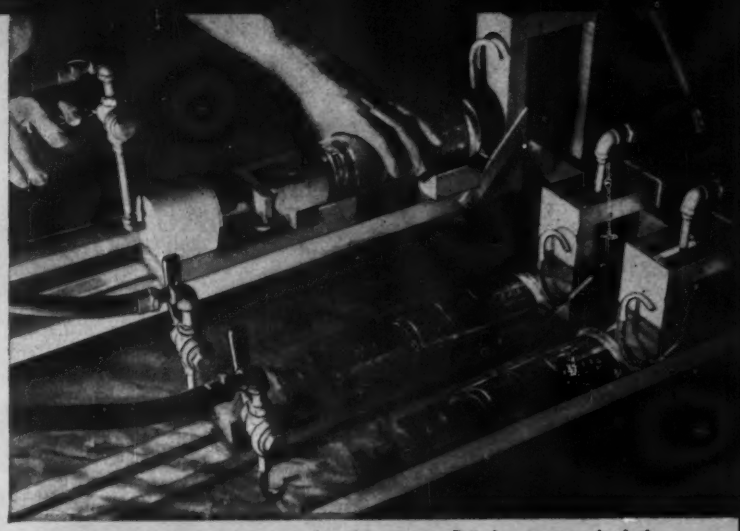
Sweden's 30-(t) Mw research reactor went critical last month. Allis-Chalmers was the builder . . . Foundation work has started for Japan Atomic Power Co's earthquake-proof plant on the coast at Tokai-Mura, 70 miles north of Tokyo.

Foundations for the 70-Mw enriched-uranium plant at Rheinsberg, near Berlin, have been finished, the Potsdam government announced. Like the Swedish reactor, it uses light water as coolant and moderator. Completion is scheduled for late 1961. Although East Germany has Europe's largest uranium ore reserves, it lacks the facilities for production of enriched uranium. Hence fuel for this plant must come from Russia. Meanwhile 200 metric tons of East German uranium ores are going annually to the Soviet Union for processing. East Germany, with small fossil fuel reserves, will soon feel the need for other energy sources.

"Status Report on Boiling Water Reactor Technology as of 1959," just published, summarizes R&D work and construction, both completed and underway, and discusses the problems and limitations of the concept. It is the first to appear of an AEC series covering eight reactor types. Together these books make up Part III of the Commission's four-part Civilian Power Reactor Program study. This first, 80 pages long, is available at 60¢ from the Government Printing Office in Washington.

Waste disposal at sea as operational practice is undesirable, according to a study made by the International Atomic Energy Agency. But the study group said that wastes of low and intermediate activity could be dumped at sea under controlled and specific conditions. The Agency, which has its headquarters in Vienna, recently stated that any "deferment of short-term expectations" for developments in atomic power is chargeable to underestimating the technological problems.





Every L-M arrester is tested under water. Dried compressed air is pumped in, at a minimum pressure of 15 psi. Any leak would produce tell-tale air bubbles. You get no leakers!

100% Testing Proves Seals Keep Out Moisture In L-M Valve Arresters

L-M was the first to use high-grade synthetic rubber —the first fully effective moisture seal. Two-way compression keeps the seals moistureproof, as shown by extensive tests, 20-year service records, with 2½ million arresters in operation.

Long the leader in valve-type distribution arresters, Line Material has also been the leader in sealing against moisture. Extensive laboratory, field, and service tests show that L-M arresters *just don't leak*.

This excellent sealing of L-M arresters is accomplished by multiple elastomer seals, held under compression. As shown in the illustration, both top and bottom are sealed. Even should the insulating cap at the top be damaged and the asphalt compound be removed, the copper cap still contains the synthetic rubber gasket under pressure, positively preventing entrance of moisture. Gaskets are contained on all sides, so there is no cold flow.

Sealing is just one of many excellent features of Line Material Lightning Arresters. Line Material offers a complete line of arresters—from 175 volts to 121 kv., with many intermediate sizes not generally offered. This permits exact application by the distribution engineer.

Get Complete Data

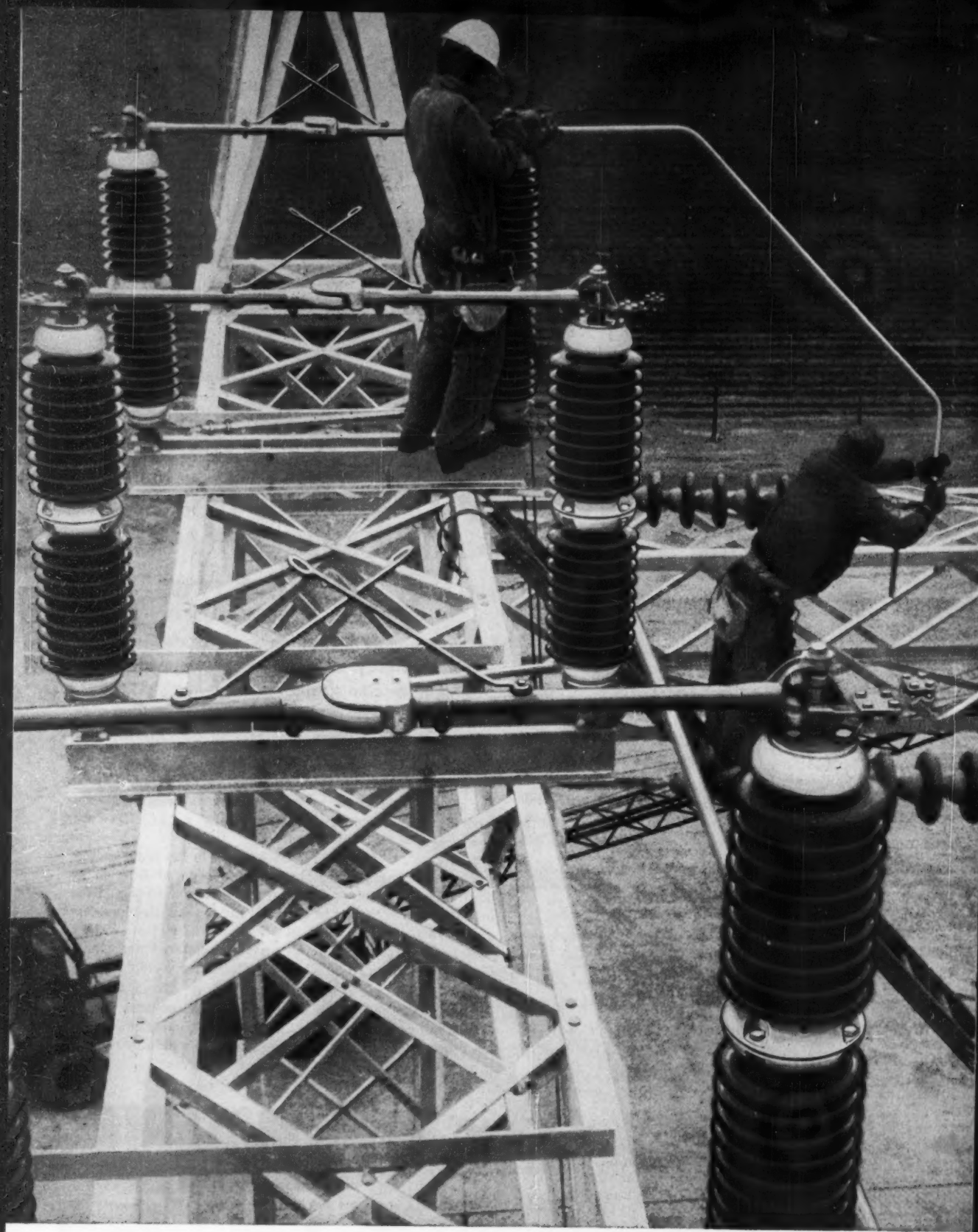
Ask the L-M Field Engineer for information on L-M Arresters, and data on arrester application problems. Or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: CLM Industries, McGraw-Edison (Canada) Limited, Toronto 13, Canada.

LINE MATERIAL®
Industries 457
McGRAW-EDISON COMPANY

Lightning Arresters

McGRAW EDISON

DISTRIBUTION TRANSFORMERS • RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS POWER SWITCHING EQUIPMENT • PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT



Southern States 115 kv, 600 ampere Type GG switches being installed. The GG is available in voltage ratings from 34.5 kv – 161 kv and continuous current ratings of 600 and 1200 amperes.

KEEP PACE ELECTRICALLY

CURRENT FOLLOWS LOW RESISTANCE PATH THROUGH SOUTHERN STATES' BRAIDLESS AIR SWITCHES

Southern States has solved the big problem of providing efficient current transfer in high pressure, braidless side-break air switches. A unique design overcomes any question of reliability in the two current-carrying swivel assemblies inherent in this type of switch.

As a result, in the new Southern States Type 57L and Type GG you can now be assured of low resistance through each swivel assembly, adequate capacity for short circuit currents, and freedom from corrosion and contamination.

This is accomplished by the four-piece swivel units* consisting of carefully machined terminal and blade castings, hinge pin, and pressure clamp —securely bolted together so that the pressure clamp and terminal casting fit into deep, matching grooves on the hinge pin. The silver-plated grooves provide a natural barrier to foreign matter, act as a stable bearing surface for the terminal, and furnish a liberal contact area. The assembly is permanently sealed with a non-aging lubricant.

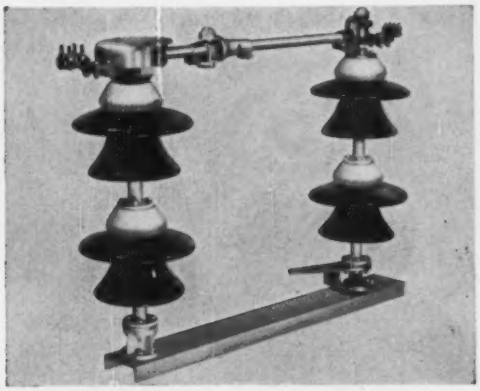
The hinge pin and terminal casting are kept under high pressure by a stainless steel coil spring (insulated by a nylon spacer) to establish the most efficient current interchange point.

The entire assembly, although under high pressure, rotates smoothly—without binding or wedging. It operates satisfactorily under short circuit conditions and well within the limits defined by NEMA for continuous current performance.

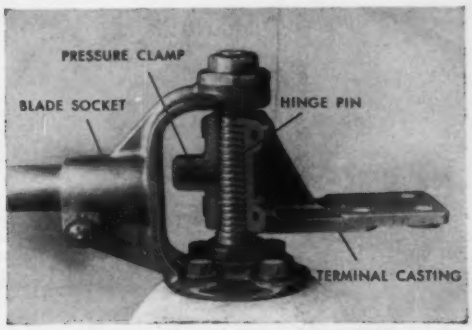
AMPLITACT® contacts are added assurance of contact performance under extremely high fault currents.

For complete details on these new braidless switches, contact your Southern States representative or write directly to us.

*Toggle point of 57L switch blade uses modified version of this assembly.



Type 57L braidless side break available in voltage ratings from 7.2 kv - 161 kv and continuous ratings of 600 and 1200 amperes.



SWIVEL ASSEMBLY—CUTAWAY VIEW

The GG uses the swivel assembly shown as the pivot on both rotating insulators. The 57L uses an identical assembly on its rotating insulator and the same construction principle at the toggle point of the 57L blade.

SOUTHERN STATES EQUIPMENT CORP.

HAMPTON, GEORGIA

IN CANADA Dominion Cutout Co., Ltd., Toronto

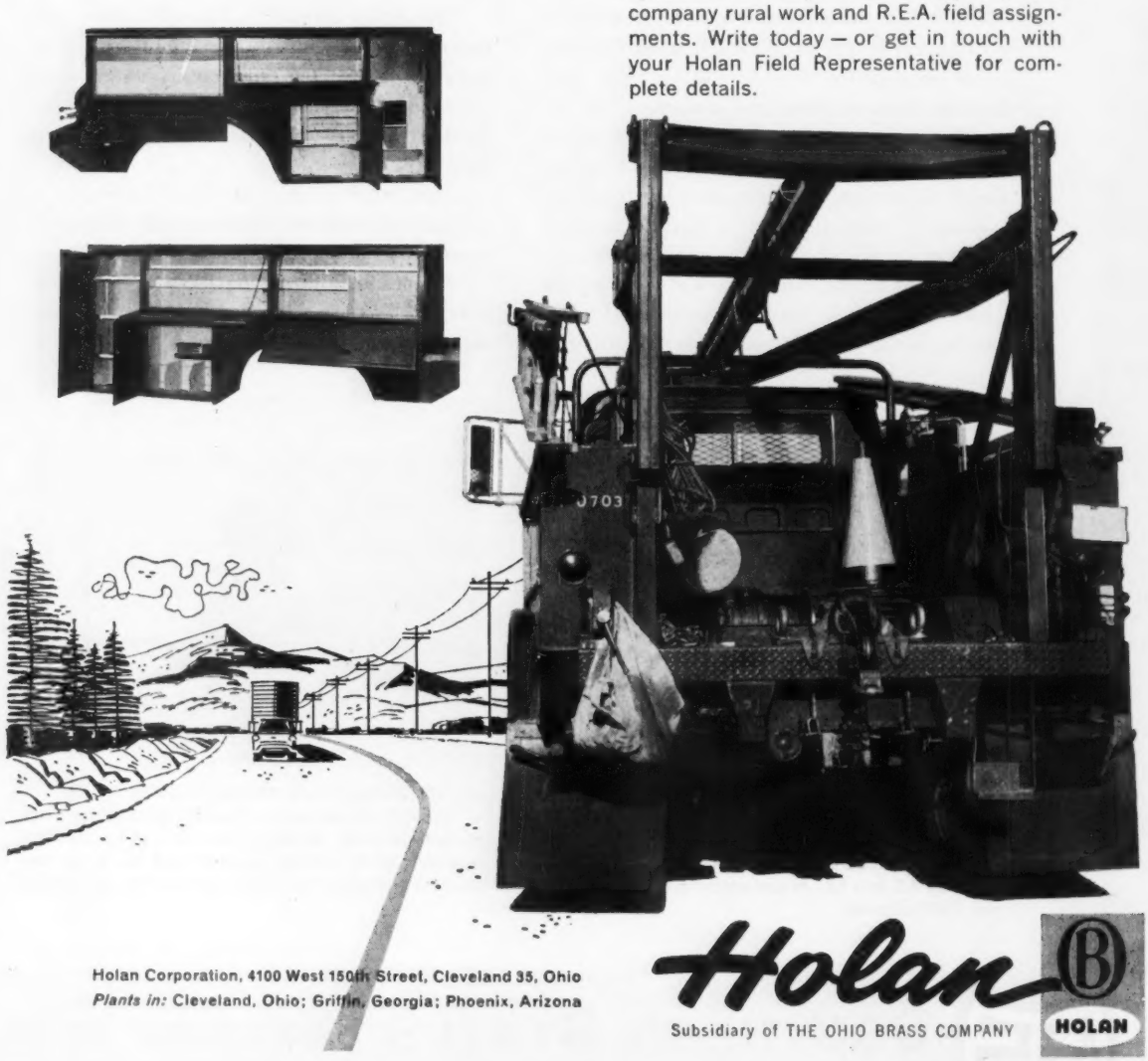
Holan "Space Vehicle" Hits the Road with Two-Day Payload

There's nothing "blue sky" about the space demands of a utility crew. To do the job — big or little — it takes a body engineered to squeeze the last ounce of payload from cab to overhang.

Holan's 5102-S Body does just that. In fact, this two-man work unit sports such functionally-designed compartments and so much room that a two-day supply of equipment can be carried without overloading.

Add to that the Model 25-C Derrick which can handle 8,500-pound loads and 60-foot poles and you have one of the industry's most economical, most efficient units. The work unit is mounted on a chassis with 72" CA and dual rear tires and has such a short body overhang that derrick load limits are appreciably increased before jacks are required.

Plenty of space . . . plenty of strength . . . and splendid for telephone, municipal, power company rural work and R.E.A. field assignments. Write today — or get in touch with your Holan Field Representative for complete details.



Holan Corporation, 4100 West 150th Street, Cleveland 35, Ohio
Plants in: Cleveland, Ohio; Griffin, Georgia; Phoenix, Arizona

Holan
Subsidiary of THE OHIO BRASS COMPANY
HOLAN

Ljungstrom rotor being installed for Southern California Edison plant at Huntington Beach, Cal. Eight such Ljungstroms will serve four boilers at this station.

AIR PREHEATER SERVICE WILL STILL BE IN EFFECT ON THESE UNITS IN THE YEAR 2000

These new Ljungstrom® Air Preheaters, being installed at Southern California Edison's Huntington Beach Station, will be protected by an unusual service policy, one that guarantees regular inspection by Air Preheater engineers throughout the life of each unit.

There's no terminal date on this service — it's in effect as long as the units are in operation. In fact, Lifetime Air Preheater Service is still helping to keep the first Ljungstrom installation in the U.S. running perfectly, although it's been in operation almost 40 years.

Air Preheater provides first-rate *factory* service too, In one instance, in response to a last-minute decision to replace cold-end elements near the end of a scheduled shutdown, Air Preheater *fabricated and shipped* over 13,000 pounds of heating elements the day after the order was received.

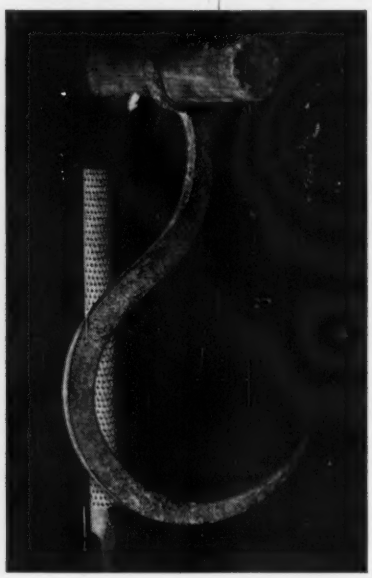
Regular inspection and fast factory service are just two of the advantages Air Preheater offers its customers. Another is expert knowledge of boiler and preheater problems, gained through 35 years' experience. This combination—knowledge of customer problems and a *continuing* interest in them — probably explains why nine out of ten preheaters sold today are Ljungstroms.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

ENJAY BUTYL

IS TOPS IN ALL-'ROUND



RESISTANCE TO TEAR AND ABRASION

Enjay Butyl offers the highest aged tear strength of any rubber . . . even after long exposure to ozone and heat! Its inherent toughness resists abrasive wear, in such applications as tires, conveyer belts, hose and other mechanical goods.

RESISTANCE TO SUN-LIGHT AND WEATHERING

Enjay Butyl has proven its resistance to ultra-violet light, ozone, oxidation, moisture and mildew. Increases life of products such as weatherstrips, garden hose, wading pools and automotive parts.

RESISTANCE TO CHEMICALS

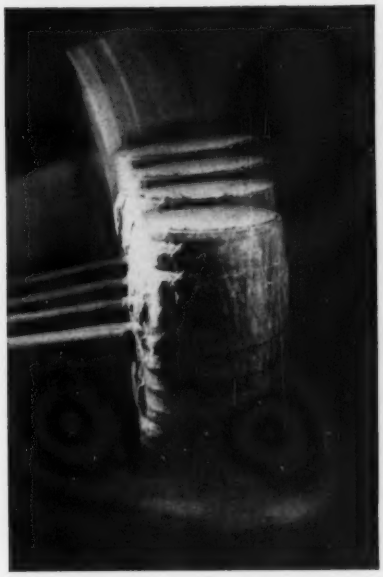
Enjay Butyl, because of its unique and extremely low degree of unsaturation, offers excellent resistance to corrosive chemicals. The preferred rubber for tank linings, hose, seals, gaskets and other applications where exacting chemical resistance is required.

VIVID COLORS

Enjay Butyl requires no additives for quality coloring over a wide range of hues. Famous for colorability and smooth finishes, Butyl has been successfully plastic coated for special applications.

RUBBER

PERFORMANCE



DAMPING PROPERTIES

Enjay Butyl absorbs shock and vibrational energy more completely than any other rubber. Resiliency can be varied in compounding and processing. Butyl is ideal for axle and body bumpers, motor mounts and sound-deadening applications.

IMPERMEABILITY TO GASES AND MOISTURE

Enjay Butyl is tops in impermeability to gases and moisture . . . retains air pressure 8 times better than natural rubber. Outperforms other rubbers in such application as inner tubes, jar and bottle seals, hoses and inflatable goods.

ELECTRICAL RESISTANCE

Enjay Butyl tops all vulcanizable rubbers in electrical and dielectric properties . . . in resistance to corona and ozone breakdown and water absorption. Its high dielectric strength insures against electric breakdown under normal or surge voltage. Its heat resistance permits higher current flow for a given conductor size.

The outstanding properties of Butyl Rubber create new horizons for the designer, and offer to manufacturers an opportunity to utilize the qualities of rubber in applications never before possible. The unique properties of Butyl have led to vast improvement in many existing products. Technical skills will open the way to countless new uses.

Butyl is the "idea" rubber with uses stretching as far as the imagination can reach. We'll be glad to tell you all about it. Just contact the nearest Enjay office.

HOME OFFICE: 15 West 51st Street, New York 19, N. Y. OTHER OFFICES: Akron • Boston • Charlotte • Chicago • Detroit • Houston • Los Angeles • New Orleans • Tulsa

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

ENJAY CHEMICAL COMPANY

A DIVISION OF HUMBLE OIL & REFINING COMPANY

ENJAY® BUTYL

COMPACT... ADAPTABLE... RELIABLE

New Westinghouse Isolated Phase Bus

Ever-increasing current and voltage ratings . . . maximum in compact arrangement . . . full adaptability to generating and distribution station layouts . . . complete reliability—these are the modern station demands met by new Westinghouse isolated phase bus. Here are the design features which assure long, trouble-free performance:

Single Insulator. Only one high-strength insulator is used at each bus support location. Deep grooves provide high dew withstand voltage. Resilient mounting reduces short circuit forces on the porcelain. All combine to provide maximum reliability of service.

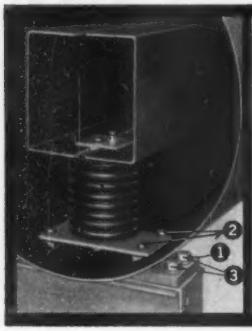
Main Conductor. Hollow square or tubular bus may be specified to suit application requirements.

Enclosure Construction. Enclosures are cylindrical; of heavy, heat-treated aluminum plate; rolled and seam-welded . . . assuring maximum strength against internal or external pressure and side stress. Enclosure tightness is assured.

Accessibility of Enclosures. Telescoping of enclosures simplifies inspection and maintenance of insulators and conductor joints. Adequate clearance facilitates telescoping and alignment. Longitudinal gaskets are eliminated. Circular, extruded, neoprene gaskets, retained by two-bolt clamping rings, make assembly easy and assure tight joints. Enclosure ends are not flanged. Small supporting feet reduce weight and provide smooth cylindrical exterior.

Coordinated Design. Westinghouse isolated phase bus is coordinated in design to assure long, economical service with minimum maintenance—and to reduce field assembly time by permitting large assembly shipments, limited only by shipping and handling facilities.

For complete facts, call your Westinghouse representative, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-60998

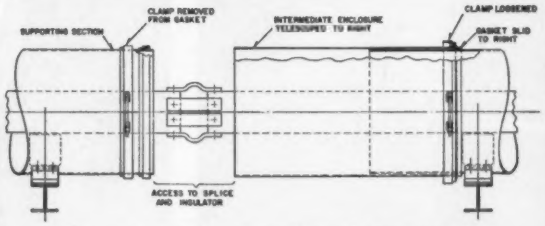


Only One Insulator Is Required at each main conductor and enclosure support location. Enclosure tightness is assured by these arrangements:

1 Welded-in support of high-strength extruded aluminum.

2 Resilient insulator mounting plate bolts dead-end in extruded support.

3 Assembly mounting bolts are external to the enclosure.

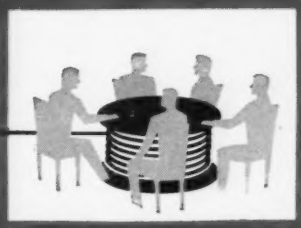


Telescoping Enclosure provides ready access to insulators and conductor joints for inspection or maintenance.

YOU CAN BE SURE ... IF IT'S Westinghouse

TUNE IN WESTINGHOUSE-CBS TV-RADIO COVERAGE, PRESIDENTIAL CONVENTIONS, JULY 10-29

WIRE AND CABLE ROUND TABLE



You have asked...

Q. What are the facts on the moisture resistance of insulation made from ALATHON® polyethylene resins?

A. Water itself has no effect on ALATHON. Even during prolonged aging, water does not cause swelling or changes in strength and stiffness. The ultimate weight gained by samples immersed in water is considerably less than 1%. More important, and a fact often overlooked, the presence or absence of water has no effect on the excellent electrical properties of polyethylene.

Water has been stored in 4-oz. polyethylene bottles (1/32" wall thickness) for periods up to a year, after which time it was found that the amount of water lost by transmission through the bottle was less than 0.3%. In fact, polyethylene is widely used as pipe to transport water, and as construction film to form a moisture barrier. The most important point to remember is that the presence or absence of water in no way affects the electrical properties of the polyethylene insulated wire or the performance of the wire.

Q. Does corona produce a surface effect or an internal one?

A. A surface effect. In case of voids in the body of an insulation, corona appears only on the inside surface of the void.

Du Pont does not manufacture wire and cable, but supplies thermoplastic resins for insulation and jacketing.

• Electrician connects cable jacketed with ZYTEL to runway lights before placing cable in sawcut.

FAA uses jacket of Du Pont ZYTEL® 37X, for unique new runway lighting system

Under comprehensive analysis at the Federal Aviation Agency's National Aviation Facilities Experimental Center, Atlantic City, N. J., are new systems of airport lighting. Attempting to speed the development of air traffic control to meet the demands of the jet age, the NAFEC has installed a new system of "pancake" lights in a 10,000-foot instrument runway. This installation required 70,000 feet of electrical wire.

Between individual lights set in the concrete runway, a 1-inch-deep sawcut was made to protect the wires connecting the lighting system. These sawcuts presented a tough installation problem for two reasons. First, because of the sharp edges of the concrete, and second, because a tapered instrument had to be used to push the wire into the sawcut. After inspecting various materials, FAA's Bureau of Research and Development, with the help of the Plastic Wire and Cable Company, Jewett City, Conn., decided to use a jacket of Du Pont ZYTEL 37X for the wire.

There are other advantages provided by the jacket of ZYTEL nylon resin. It resists the chemicals in the sealant used to fill the sawcuts, and is unaffected by the extremes of summer heat and winter cold. And ZYTEL is so tough that it can provide lasting protection with a minimum thickness. Thus, the wire is light and easy to ship, handle and install.

It will pay you to investigate how ZYTEL and the other Du Pont plastics may help you solve your wire and cable problems. Find out how by writing your wire and cable supplier, or: E. I. du Pont de Nemours & Co. (Inc.), Department M-613, Room 2507A, Nemours Building, Wilmington 98, Del. In Canada, Du Pont of Canada Limited. P. O. Box 660, Montreal, Quebec.

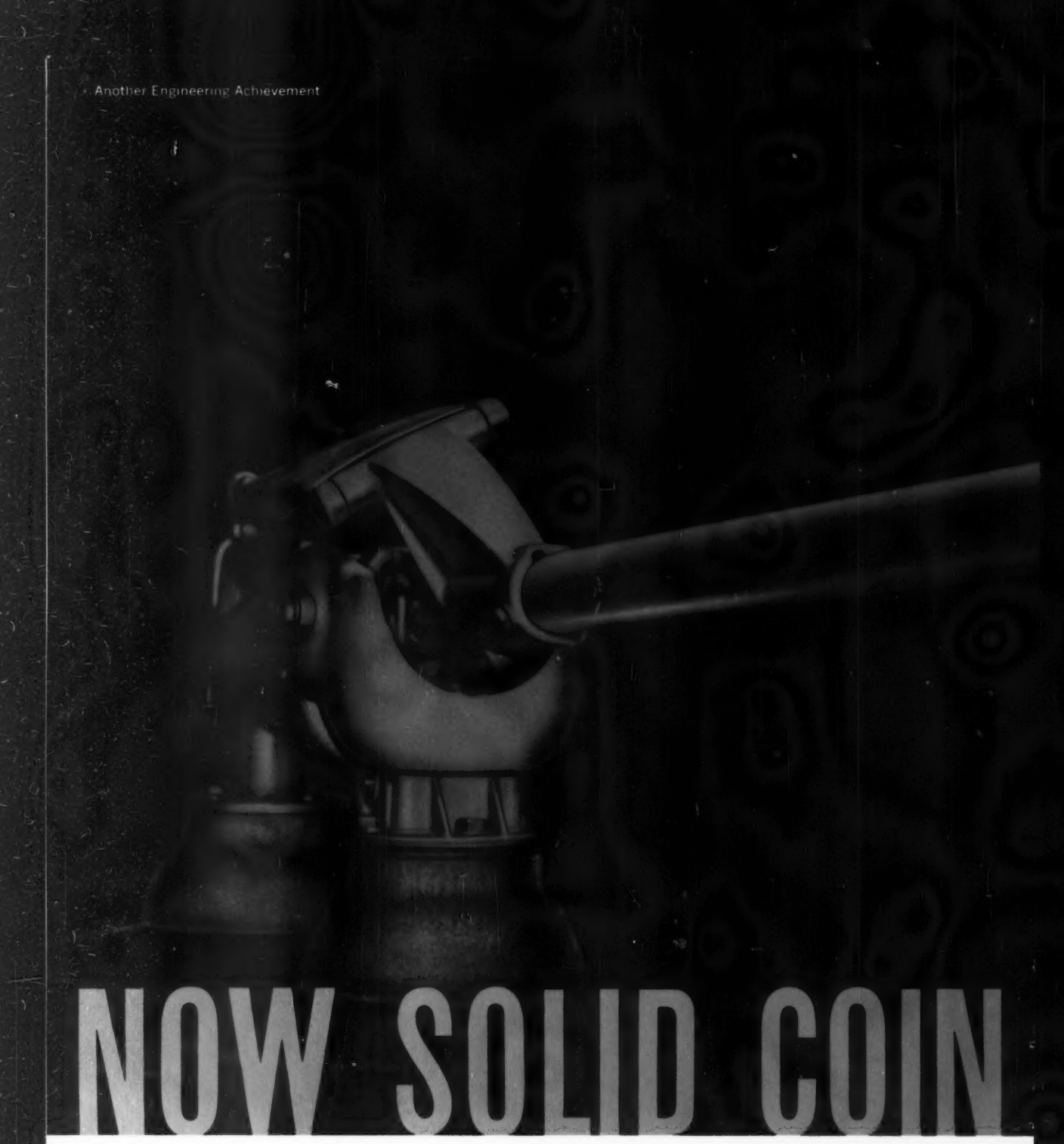
POLYCHEMICALS DEPARTMENT

DU PONT

Better Things for Better Living . . . *through Chemistry*

ALATHON® POLYETHYLENE RESINS | **RULAN®** FLAME-RETARDANT PLASTICS | **ZYTEL®** NYLON RESINS

Another Engineering Achievement



NOW SOLID COIN

FROM FEDERAL PACIFIC...NEW HIGH PRESSURE CONTACTS

HIGH PRESSURE CONTACT with no galling action at the contact areas! Federal Pacific's rugged new Air Disconnect Switches use integral, solid coin silver inserts that are harder than the hard-drawn copper. Permits heavy wiping action assuring thorough cleaning, more consistent low contact-resistance, ability to withstand high momentaries. Eliminates corrosion under adverse atmospheric conditions.

ANOTHER FEDERAL PACIFIC FIRST. This revolutionary design gives you a complete line of Air Disconnect Switches with longer, maintenance-free life. Eliminates the need for multiple, parallel contacts. Available on TG & YVH group-operated switches. Vertical break types: 7.5—34.5 kv (400, 600, and 1200 amp) and 46—330 kv (600, 1200 and 1600 amp) and center side break types: 46—161 kv (600 and 1200 amp). Over 50 years experience in design and manufacture of power switches for utilities helped bring forth this new development.

SPECIAL LABORATORY TEST APPARATUS designed to study galling phenomena, the first of its type—was created by Federal Pacific to duplicate switch closing action and

SILVER CONTACTS

FOR AIR SWITCHES... HARDER THAN HARD-DRAWN COPPER

record variations in coefficient of friction at contact. Result: the first high pressure, maintenance-free solid silver to solid silver contacts that will not gall!

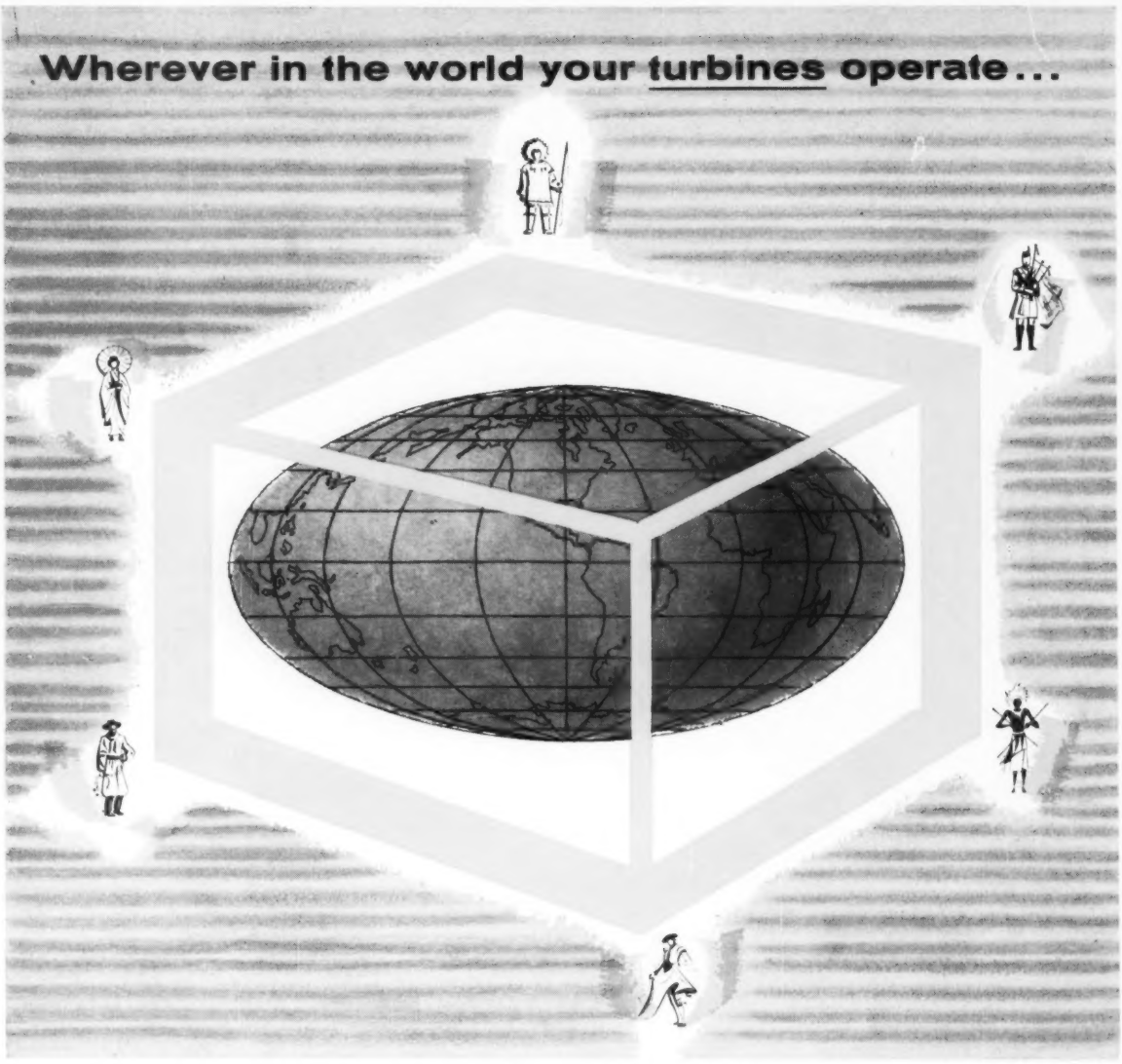
Additional information on the new Federal Pacific Air Disconnect Switches with harder, non-galling, solid coin silver to solid silver contacts may be obtained from your local Federal Pacific Electric Representative, or by writing to Federal Pacific Electric Company, General Offices: Dept. 388, Newark 1, New Jersey—The Best in Electrical Control, Distribution and Power Equipment.

FPE

FEDERAL PACIFIC ELECTRIC COMPANY

Affiliated with Cornell-Dubilier Electric Corporation

Wherever in the world your turbines operate...



Other outstanding Shell Industrial Lubricants available world-wide

Shell Tellus Oils – for hydraulic systems

Shell Alvania Grease – multi-purpose industrial grease

Shell Rimula Oils – for heavy-duty diesel engines

Shell Talona R Oil 40 – anti-wear crankcase oil for diesel locomotives

Shell Dromus Oils – soluble cutting oils for high-production metalworking

Shell Macoma Oils – for extreme pressure industrial gear lubrication

Shell Voluta Oils – for high-speed quenching with maximum stability

AN INTERESTING FACT!
Every Shell Branded Industrial Lubricant is named for a sea shell. Shown here is the Turbo crassus.

Shell Turbo Oil is there

Around the world, Shell Turbo Oil is available—under the same brand name and providing the same outstanding performance. This is assurance that your customers abroad will enjoy the superior turbine lubrication that domestic customers insist upon.

Shell Turbo® Oil provides these 4 outstanding reasons for its acceptance as a top-rated lubricant for utility, industrial and marine turbines: (1) It has exceptional oxidation stability for maximum service life. (2) It separates readily from water. (3) It protects against rust. (4) Its performance does not vary—make-up oil is identical to the original charge regardless of time of purchase.

No matter where your turbines operate, make Shell Turbo Oil your standard recommendation. Write for complete information.

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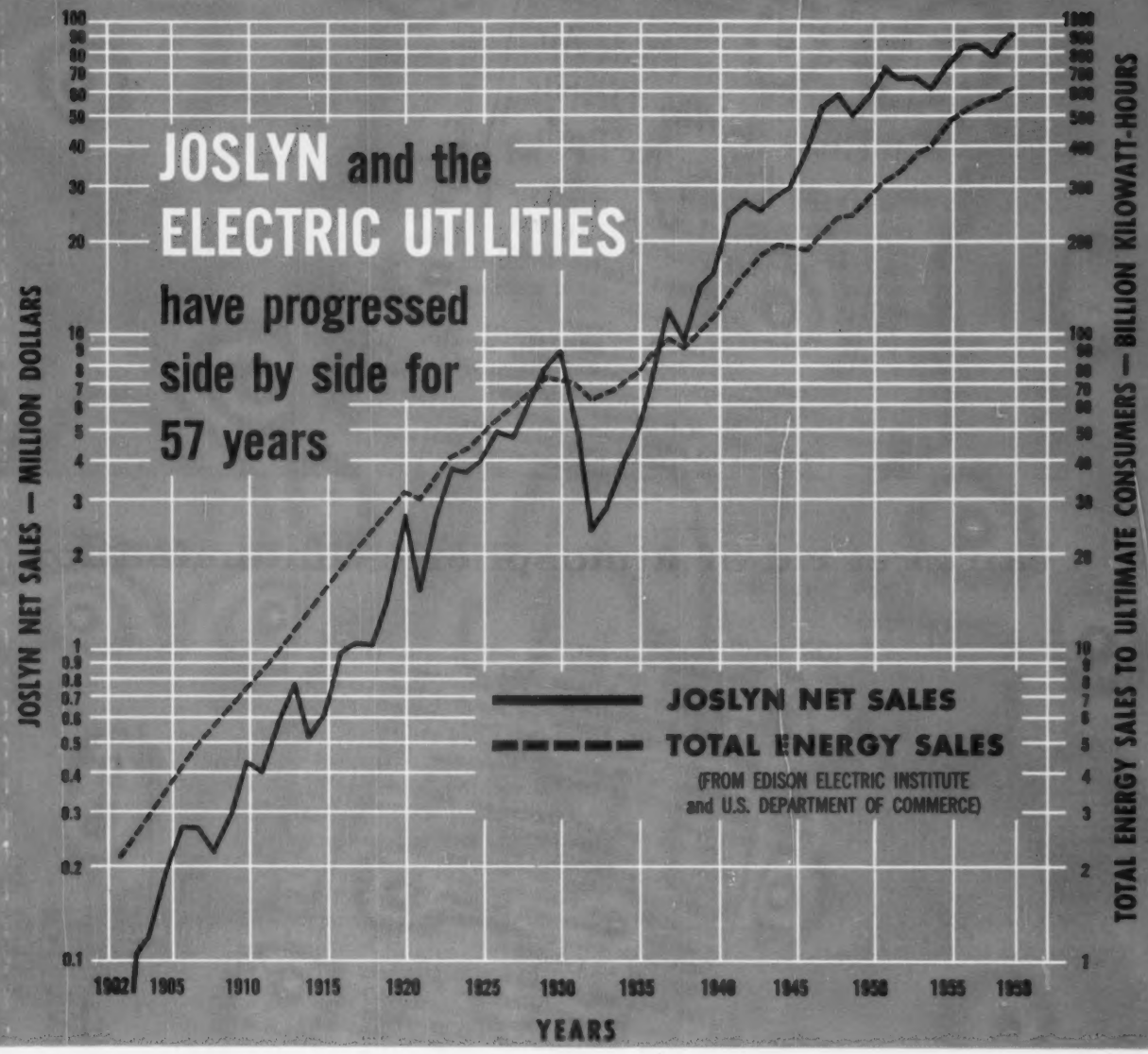
SHELL


JOSLYN and the
ELECTRIC UTILITIES
have progressed
side by side for
57 years
JOSLYN NET SALES — MILLION DOLLARS
TOTAL ENERGY SALES TO ULTIMATE CONSUMERS — BILLION KILOWATT-HOURS
JOSLYN NET SALES
TOTAL ENERGY SALES
(FROM EDISON ELECTRIC INSTITUTE
and U.S. DEPARTMENT OF COMMERCE)
1902 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1958
YEARS

QUALITY PRODUCTS TO INSURE UNINTERRUPTED ELECTRIC SERVICE

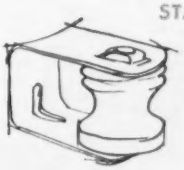
POLE LINE HARDWARE

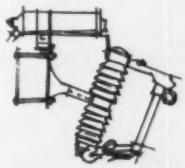
POLES—CROSSARMS PORCELAIN INSULATORS

STREET LIGHTING EQUIPMENT

PROTECTIVE DEVICES HIGH VOLTAGE SWITCHING EQUIPMENT

STAINLESS STEEL





LIVE BETTER ELECTRICALLY

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JOSLYN MFG. AND SUPPLY CO.

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You can't get rid of atmospheric contamination...

Government Finds Air Grows Dirtier Despite New Preventive Push

* * *

Los Angeles Leads in One Type Of Dirt, Phoenix in Another; Local Groups Confer Today

By James A. Reynolds
Staff Reporter of The Wall Street Journal

WASHINGTON—The Government is about to unveil the initial findings of the first systematic attempt to measure the scope and seriousness of a major national problem: Dirty air. An advance peek at the findings indicates the problem is indeed serious and involving preven-

The dry desert ... heavy load of nose-clogging ... it's relatively free from the chemical pounds which may cause lung cancer, eye smarting, bronchial ills, and other ailments. Not surprisingly, Federal air samplers found the highest concentration of these air-borne chemicals in Los Angeles, fondly called "The Smog Capital of the World" by some of its residents.

Phoenix and Los Angeles are only two of 167 spots across the country, both urban and rural, where the U.S. Public Health Service is regularly taking air samples. The first Federal findings, based on samples pulled out of the air last year, will be made public here during a Government-sponsored National Conference on Air Pollution that starts today.

The Keys and the Capital

Even the layman can see a startling difference in some of the samples tested by the P.H.S. One filter which will be exhibited this week has only a few specks on its white surface; it was used in sampling the pure ocean air in the Florida Keys. Another filter turned dirty brown during its 24-hour run; it came from the nation's capital, where the air is relatively clean—for a big city. But a third filter is caked with jet black grime; it came from Cleveland.

The sampling network, it's hoped, will provide answers to two questions which have long puzzled public health experts: Where is the air dirtiest now? Where is it getting dirtier? Last year's sampling should answer the first question, while subsequent surveys should answer the second one. Once they know the extent of the air pollution problem, officials add, they can intelligently work out an effective air-cleaning program.

"Pollution of the air is an unwanted by-product of progress, and it tends to grow as our cities and industries grow," warns U.S. Surgeon General LeRoy E. Burney. "It is time for us to take stock of what we know and what is being done about air pollution, and to outline a plan which will enable us to keep pace with the growing dimensions of the problem."

This week's conference is designed to speed up the stock-taking process. Air pollution experts from all over the country will analyze the causes and effects of dirty air, and offer proposals for cleaning it up. Dr. Burney hopes the conferees will agree on a 10-year anti-pollution plan which will include specific goals ... programs and pollution-

Lapp introduced the "Fog-Type" insulator design 35 years ago to answer the demand for an effective means of overhead transmission under conditions of severe atmospheric contamination.

All evidence points to the fact that dirt conditions today are worse than ever before, and that there is no real relief in sight.

Realistic appraisal of the problem dictates the wisdom of ***handling*** dirt conditions, which, for outdoor distribution, transmission and station systems, means ***insulating*** for it.

..... Better insulate for it

Why has Lapp's 35-year concept of Fog-Type design remained the one constant in this much-misunderstood area of insulator behavior? Why have Lapp Fog-Type corrugations become the industry standard design for bushings, potheads and other critical outdoor use?

It is because Lapp Fog-Type design is based on the principle of avoiding leakage flashover by controlling leakage current flow. The extra length of leakage path is also a uniform leakage path. Dry, high-resistance, shielded areas of insulator surface are avoided; instead, there's a maximum exposure of surface to contamination . . . to wetting . . . and to cleaning action of wind and rain. Current flows evenly, voltage is distributed over the surface, leakage flashover is prevented.

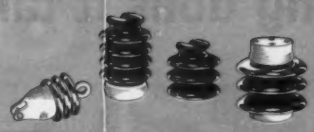
Even in most areas of severe atmospheric contamination, Lapp Fog-Type insulators require no cleaning; where they do, cleaning intervals are longer, and cleaning is easier than on other types.

Forward utility thinking now calls for use of Fog-Type insulation on *all* systems in sea-shore or urban locations. It pays off in improved service and reduced maintenance costs.

"Fog-Type design" has been a provocative subject over the years. Lapp's viewpoint is explained, and substantiated, in the new Lapp Catalog No. 8. If you have not received a copy, ask for it.

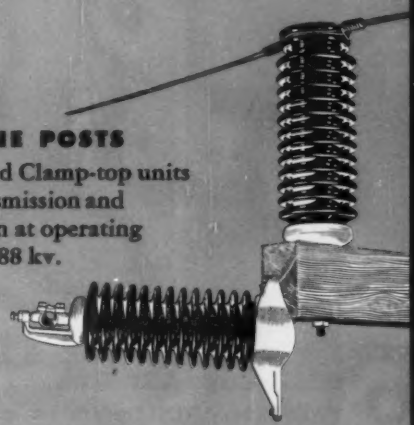
Lapp Insulator Co., Inc.,
LeRoy, New York.

Lapp



LAPP DISTRIBUTION FOG-TYPE INSULATORS

• Fog pin-types for voltages to 20 kv; Distribution Posts in three sizes for use up to 27 kv; Fog-Type distribution dead end insulators; Distribution switch Posts in four sizes to 150 BIL.



LAPP LINE POSTS

Tie-wire and Clamp-top units for subtransmission and transmission at operating voltages to 88 kv.

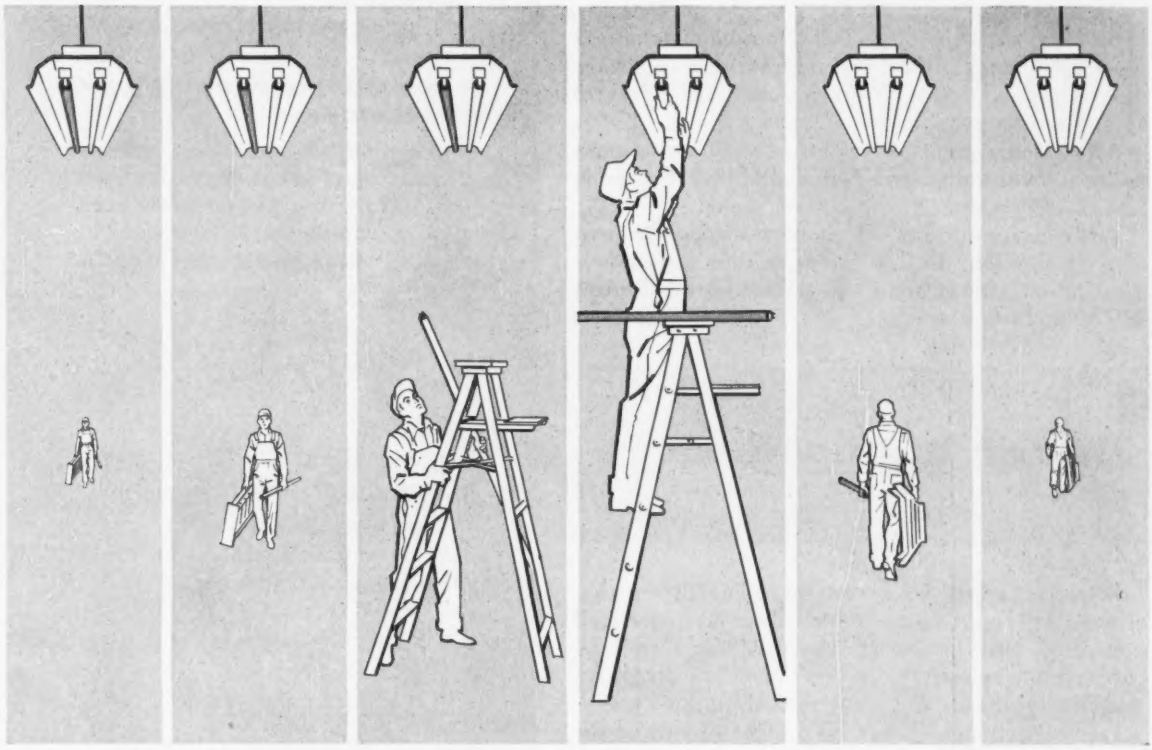
LAPP STATION POSTS

Superior electrical and mechanical characteristics for all switch and bus support at voltage ratings to 1,800 BIL.

SUSPENSION FOG-TYPES

Standard strength (15,000-lb.) and high-strength (25,000-lb.) units for 5¾" or 6½" spacing, either ball-socket or clevis type.

How long does it take him to replace one lamp?



TWENTY MINUTES! That's the average time it takes to replace one lamp. First the phone call for maintenance, then the requisition, lamp, ladder, hike to the site, lamp replacement, the walk back, disposal of old lamp, put ladder away. And work interruptions among other employees, caused by one-at-a-time lamp replacements are an expensive item not included.

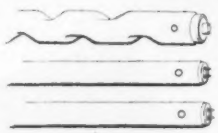
This General Electric Plan can save your customers 26 hours labor on every 100 lamps!

It takes a man about 33 hours to replace 100 lamps if he does it one-at-a-time . . . and less than 7 hours if he does it with this modern General Electric Plan for group relamping. That's a cut-and-dried savings of 26 hours for every 100 lamps your customer uses. Twenty-six times the hourly cost of one maintenance man!

But there's more! With this plan a customer also gets up to 25% more light, 75% fewer work interruptions, 75% fewer buying and stocking headaches . . . and a better looking lighting system.

Records prove this simple plan works best with General Electric Lamps. Why? Because they have a more uniform lamp life. They last most customers well over 2 years . . . with fewer early burnouts. What's more, the plan has a built-in reminder that eliminates record-keeping—tells when it's time to begin another cycle. *Right now* is the best time for you to suggest this money-saving system to each of *your* customers. General Electric Co., Large Lamp Dept. C-022, Nela Park, Cleveland 12, Ohio.

G-E LAMP UNIFORMITY MAKES GROUP RELAMPING PRACTICAL



Powerful Power Groove

Mighty Premium 3

Economical F-40

Progress Is Our Most Important Product

GENERAL ELECTRIC

ALLIS-CHALMERS

COMPACT
Core and coil cut vault requirements per kva. Effective coil bracing assures high short-circuit strength.
NO HIDDEN SURFACES
Corrugated tank-cooling surface eliminates all dirt-catching, hard-to-clean corners and crevices. Simplifies painting.
LOW NOISE LEVEL
A-C core design — a result of long experience with all electromagnetic, mechanical factors and testing — minimizes noise.
LOW EXCITING CURRENT
A-C cores of nonaging grain-oriented silicon steel have lower core-grain flux, exciting current.
WOUND
Continuous high-voltage winding has no joints. Solid insulation barrier between low-voltage windings and core.

Network news! smaller, vault-saving size

Smaller, lighter, more efficient — these advances mark the latest Allis-Chalmers network transformer developments. They're reliable, compact powerhouses — whisper-quiet performers.

And how they save you money! Reduced dimensions make them easier to handle, easier to lower into smaller, economy vaults. Your labor, equipment rental and operating costs nosedive.

Consider this, too! A new A-C network in an existing vault "opens up" previously tight quarters, eases routine inspections. Welded main cover ends gasket maintenance . . . bushings are easily replaced from outside in event of damage.

• • •

Whether you're thinking about a new or replacement network transformer, see your nearby A-C office and save money. Or write **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.* A-1317

A 5000° flame takes ten minutes to penetrate a one-quarter inch piece of CDF's new Dilecto RD-105 laminate. The same thickness of cold-rolled steel is pierced in less than forty seconds.

Molded from graphite fabric impregnated with a heat (ablation)-resistant phenolic resin, new CDF grades RD-105 and RD-115 are being evaluated in solid propellant rocket motors.

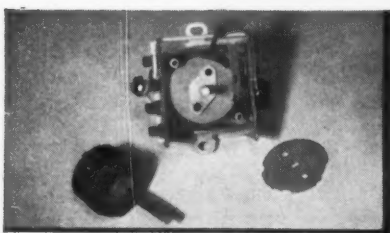
Dilecto laminates are only one family of products from industry's largest selection of non-metallic structural materials and electrical insulations. Vulcanized fibre, silicone rubber and mica, and thermosetting moldings are also supplied by CDF.

CDF can provide both quality and true economy in selecting plastic materials best suited to your needs. Refer to SWEETS PD file or write to us for General Folder 60.

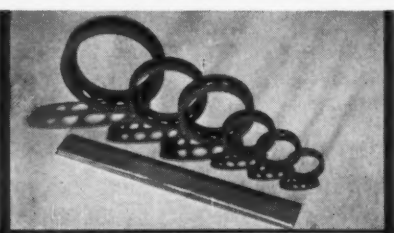
CONTINENTAL-DIAMOND FIBRE

A SUBSIDIARY OF THE Budd COMPANY • NEWARK 15, DEL.

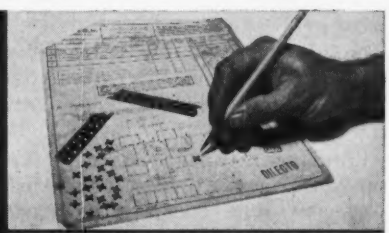
In Canada, 46 Hollinger Road, Toronto 16, Ont.



Moisture-resistant and low cost Dilecto cams for automatic washer and dryer controls.



Dimensionally stable, light weight, oil-resistant Dilecto ball bearing retainer rings.



Easily fabricated paper-base, punching grade Dilecto precision switch insulators.

ALLIS-CHALMERS

New Aluma-Clad switchgear combines long-range economy with

styling for the sixties

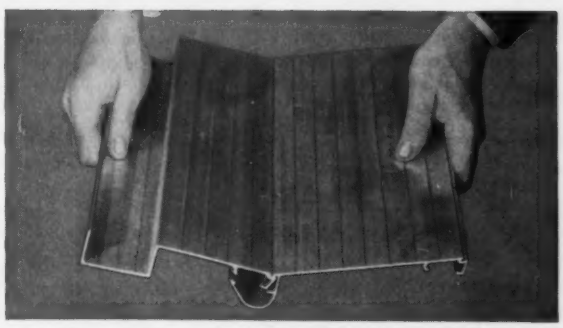
Lasting beauty, long-range economy. You get both with new *Aluma-Clad* switchgear enclosure.

Modern, functional design makes this an innovation welcome in any neighborhood. Ribbed, all-aluminum exterior is soft finished to prevent offensive glare. Color-anodized trim enhances its beauty.

Painting is completely unnecessary! *Aluma-Clad* switchgear can't rust. Its aluminum exterior resists corrosion from salt air and contaminated atmospheres.

Low installation costs! Lightweight aluminum sections dramatically reduce installation time, labor cost. Panels bolt together with aluminum alloy bolts and neoprene gasketing. Because of the unit's light weight and unusual rigidity, simple concrete piers can be used instead of heavy slabs.

Contact your nearby A-C office for complete details on *Aluma-Clad* switchgear, or write **Allis-Chalmers,** Power Equipment Division, Milwaukee 1, Wis. A-1283



Interlocking modular panels snap together to form a permanent leak-proof joint. Extruded vertical joint sections, every six inches, act as reinforcement — provide exceptional rigidity.

Aluma-Clad is an Allis-Chalmers trademark.

*Controls for a 1,260,000 lb/hr boiler are housed on a 36" wide console**

Centralized control space-saver

... the POWRMAG REMOTE CONTROL STATION

Easy to operate, and featuring front mounting and removal, the PowrMag Remote Control Station is ideal for the compact consoles demanded by centralized control. Here are some of the facts on PowrMag:

FULL STATION—size 2¼" x 5¼". As shown above, contains set point, bias or ratio dial, manual/automatic switch, manual control dial, output signal and null indicators.

HALF STATION—size 2¼" x 3⅛". With set point, bias or ratio dial, plus output signal indicator.

BUMPLESS TRANSFER—Simple adjustment of null-indicator provides bumpless transfer from Manual to Automatic or back. No operator memory is required. Output signal indicator shows valve or other control element position.

FRONT MOUNTING AND REMOVAL—Makes unit easy to check or change. AN-type connector, and 12-wire color coded cable makes it easy to interconnect system.

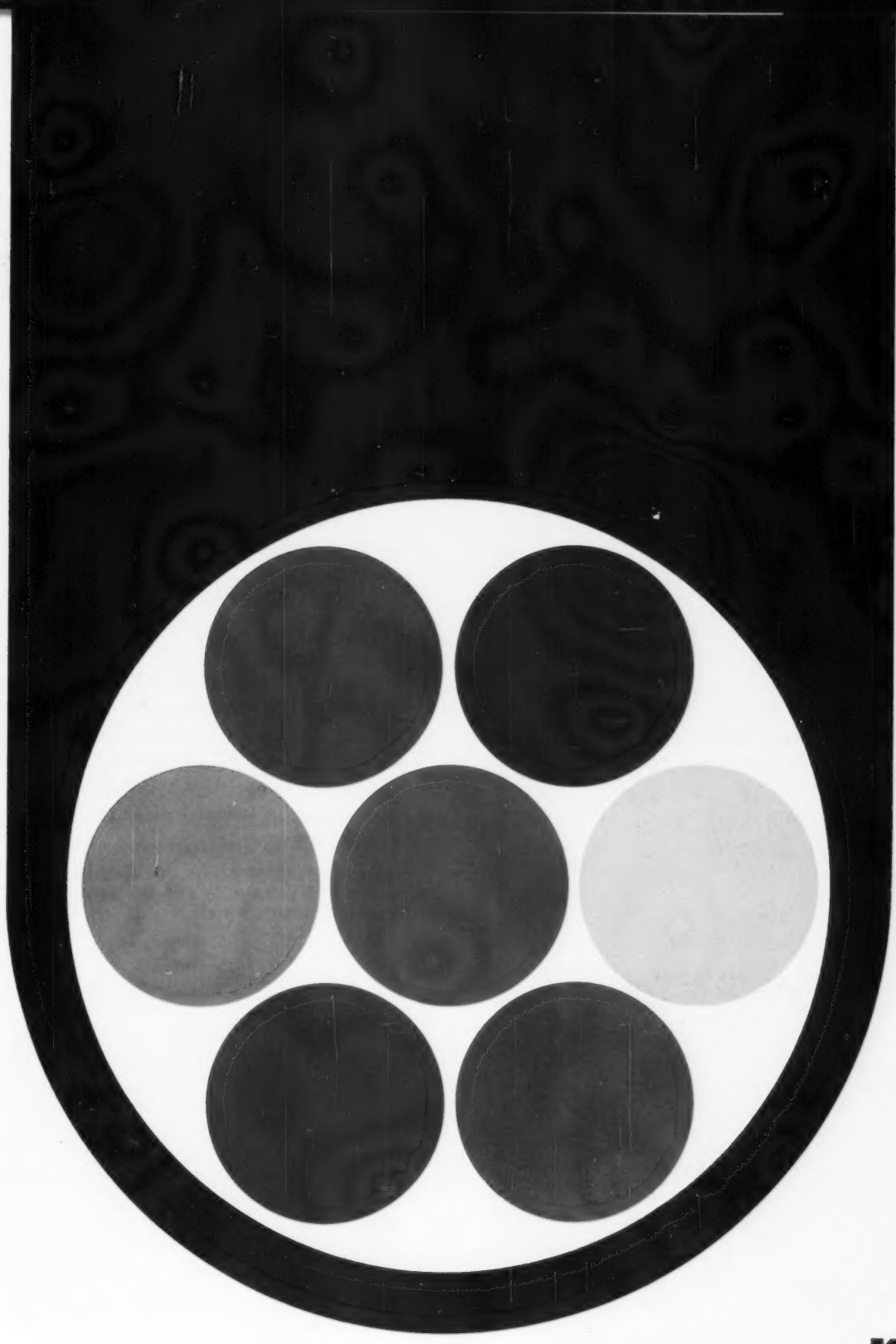
The complete system includes PowrMag Control Units and PowrMag Patchboards. Control units consist of operational magnetic amplifiers together with interchangeable reset, rate and other circuit packages to perform all control functions. Patchboards interconnect the system in any desired manner—no solder connections or terminal boards—all connections are made by special taper pins.

A letter or phone call will bring you more information on reliable, space-saving PowrMag. **Ask for Bulletin MSP-163.**

*Name on request

HAGAN
CHEMICALS & CONTROLS, INC.
HAGAN CENTER, PITTSBURGH 30, PA.

HAGAN DIVISIONS: CALGON CO. • HALL LABORATORIES • BRUNER CORP.



IN ELECTRICAL WIRE & CABLE . . . **THE SPARK OF QUALITY IS KAISER WIRE EXPERIENCE**

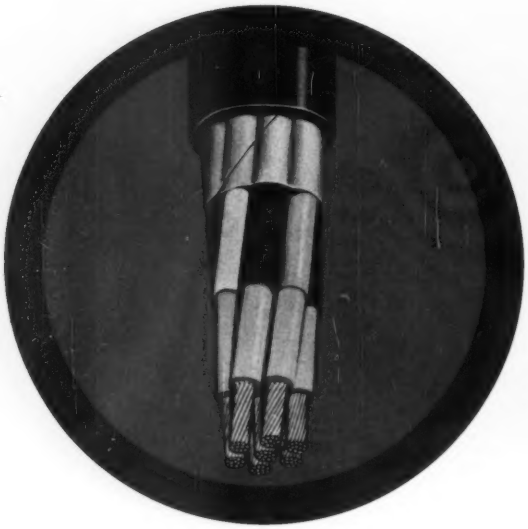
KW CONTROL CABLE... 28 YEARS OF PERFECT INSULATION SERVICE

KAISER MASTER LAYTEX® CONTROL CABLE has never known a reported insulation failure!...and the introduction of patented Laytex-Resin promises to improve upon this 28-year record of perfection!

Laytex-Resin is the combination of Laytex insulation with a specially-compounded resin layer over the insulation that eliminates the bulk of braided coverings. It brings the following advantages over extruded constructions:

Smaller diameter, to expand service without enlarging ducts...less weight...increased flexibility...proven greater insulation protection against acids, alkalies, flame, fungus, water, oil, ozone and light...uniform protection free of thin spots...can't wick moisture or fray...easier splicing...brighter color coding and longer lengths per reel.

SPECIFY 935-S. ASK FOR KAISER CONTROL CABLE BOOKLET.



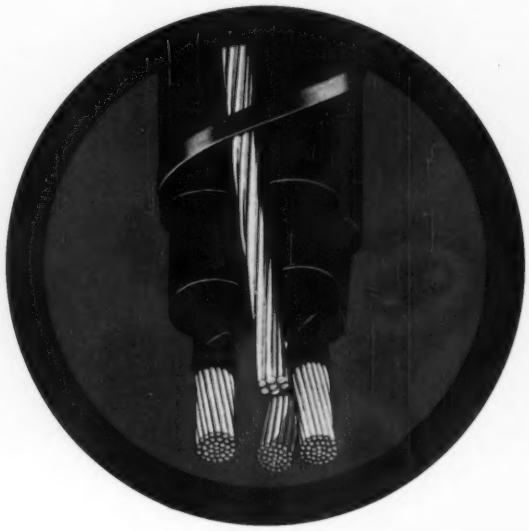
KW POWER CABLE... 16.4 TIMES MORE OZONE RESISTANCE

KAISER GRIZZLY® POWER CABLE is the only power cable to resist 6000 hours of high ozone shock test—outlasting 9 leading brands tested!

Several samples of each unshielded 5KV cable were placed with a "U" bend resting on a grounded metal plate. A conductor-to-plate potential of 40,000 volts was applied until all cables failed. Four brands failed immediately. The last competitor gave out 432 hours before the first Kaiser cable. Kaiser Grizzly samples went on to last over 6000 hours . . . 16.4 times longer than the test average of best performances . . . 2.4 times the life of the nearest competitor.

The reason: A superior combination of Kaiser insulation and jacketing. In power cables it represents a major victory over the main cause of failure—dielectric breakdown due to ozone.

AVAILABLE IN A WIDE RANGE OF SIZES AND SPECIFICATIONS FOR OVERHEAD AND UNDERGROUND HIGH-VOLTAGE APPLICATIONS.



K/W EHV...1000 MILES OF 345KV...MUCH MORE IN THE FUTURE

KAISER ALUMINUM EHV CONDUCTORS span more than 1000 of the 2500 miles of extra high voltage transmission lines now in service in this country.

As system voltages of 345KV, 460KV and higher become more common, Kaiser offers specialized conductor design, manufacturing, and installation experience.

Kaiser engineers are actively engaged in utility experimental EHV installations...field measurements of corona loss as it affects radio and TV interference . . . bundled conductor and accessory analysis . . . problems of galloping conductors...vibration and tension studies . . . and other research toward better conductor design and installation.

As a result, standard paper expanded core conductors—as well as such designs as hollow core, "I" beam, and tubular expanded core—have been manufactured and subjected to torturous field installation procedures for evaluation.

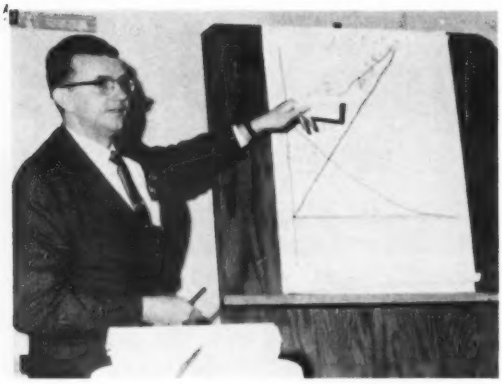
IN ELECTRICAL WIRE & CABLE THE SPARK OF QUALITY IS K/W EXPERIENCE

The spark of quality means positive—often dramatic—savings in service for those who will specify Kaiser wire and cable.

Among the world's leading electrical wire and cable producers, only Kaiser is heir to the 70-year experience of a major rubber company in developing insulation and jacketing compounds.

Insulations such as Laytex®, Laytex-Resin, Hydrosec® and Kalzone give greater utility, longer life to a complete range of aluminum or copper conductors. For immediate service in any type of wire or cable, call your K/W Distributor or Kaiser Aluminum & Chemical Sales, Inc., Kaiser Center, 300 Lakeside Drive Oakland 12, California.

KAISER ALUMINUM



"Rochester Gas & Electric realizes annual savings of $.80 kvar with Secondary Capacitors"

*Harry G. Saddock, Rochester Gas & Electric Co. Rochester, N. Y.

"We have approached the problem of justifying secondary capacitors from several different angles . . .

"An analysis of the economics of secondary capacitors from the standpoint of released capacity showed an annual saving of 50¢ per kvar per year exists at low densities.

"We also considered the secondary capacitor from a loss reduction viewpoint, and have concluded that secondary capacitors nearly pay for themselves from losses alone on 90% p.f. secondaries, and save an additional 50¢ per kvar per year at 80% p.f. Our study indicated that, in both instances, the first unit is the most beneficial . . . so that small-size secondary capacitors scattered uniformly over the system would be the ideal economic solution from the loss reduction standpoint.

"Then, we studied the economics of secondary capacitors from the viewpoint of voltage revenue gain. This study showed that the saving in dollars per kvar of secondary capacitors is about 40¢ per kvar.

"The advent of the meter socket type capacitor has also shown us a way to minimize all the important engineering time in application of our base capacitors. A good percentage of our base kvar may be supplied without sacrificing our diminishing pole space, without costly engineering time, and with a substantial annual savings, besides."

**A reprint of Mr. Saddock's paper, presented at the Second Annual Sangamo Capacitor Seminar, is available on request.*

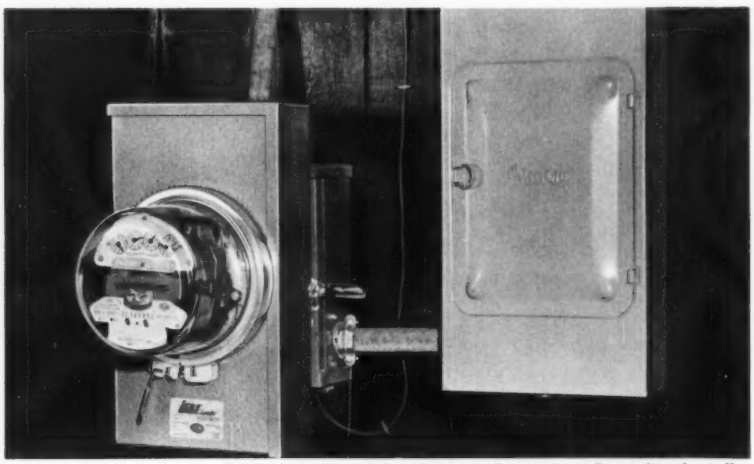
The Most Economical Secondary Capacitors to Install are Sangamo Secovars

Secovars—240 volt secondary capacitors—are easily installed right at the meter box to relieve the var load all down the line: from the service entrance to the secondaries, to the distribution transformer, to the power transformer, to the generator.

They cut installation costs . . . one-man installation realistically reduces the installed cost per kvar of Secovars in comparison to that of pole-type secondary capacitors. They conserve valuable pole space, too, and eliminate expensive engineering time.

Sangamo's exclusive Secovar Capacitors are available in three types to meet your requirements: Type OS (Original Socket) 2 kvar ratings; Type S, a 2 kvar rating for socket mountings; and Type N, a 1 or 3 kvar rating for nipple mountings. All types are fused, and some models can be furnished with a Klixon thermostatic switch if desired. All three feature weatherproof aluminum housings.

For the whole Secovar story, talk to your Sangamo Representative, or write for Bulletin 1132.



Typical meter socket Secovar Secondary Capacitor installation on the Rochester Gas & Electric Corporation system.

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

Editorial Comment

JUNE 13, 1960

Act Now to Get Industry Planks in Party Platforms

Finishing touches will be placed on the platforms of both political parties within a very few weeks. Now is the time for the private utility industry to make itself heard among those who will form the councils that will hammer together the planks. Otherwise, the industry must resign itself to living with whatever federal power and natural resources policies the politicos arrive at on their own.

Too often, party platforms—in the composition stage—have been ignored by the very interests most affected. This should not, and need not, be.

The private utilities right now have a fleeting opportunity to make a united effort to place their own ideas of proper power and resource policies before the plank writers of both parties. At the very least, these would provide material for arbitration; at best, they might be adopted.

The story on page 44 of this issue indicates those likely to head up the jobs of platform writing and gives some inkling to current thinking on both sides of the political fence. It is must reading.

Above all, the industry needs to make a show of strength at this critical time. It has good friends in the political ranks. And it owes these friends its assurance of support and concrete evidence that it is seriously concerned about federal power and resources policies.

The electric utility industry, through Robert T. Person, president of Public Service Co of Colorado, and spokesman for Edison Electric Institute, has presented its case to a Democratic advisory committee on natural resources. But action need not stop there. The actual writers of both party planks can and should be given the industry's outlook.

European Power Developments Spur Coverage

The American power industry no longer can afford to turn its back on the activities of its overseas counterparts. It has been aware for a long time that foreign equipment and system designers have noteworthy ideas. Beyond this, two new reasons have come to light.

First, the threat of competition from foreign equipment builders has today unwelcome possibilities for domestic suppliers.

Second, we must accept the fact that we are waging economic warfare with another ideology, a conflict in which power figures prominently.

With these circumstances in mind, Electrical World will reinforce its coverage of foreign power developments on a broad front. For some time, we have made good use of the far-flung McGraw-Hill World News Bureau to obtain news of overseas power developments for our readers. Much more is needed. Now we are going after such news in depth.

This publication's policy is to pursue foreign power affairs now through overseas technical correspondents on our retainer, and to put our own engineering editors into the foreign field whenever and wherever developments call for it.

One of our senior men is in Western Europe now (see p 46). Although he will file a series of prompt articles on power facilities, his more important assignment is to reinforce our contacts with top Continental and British engineers, operators and authorities.

The result will be increased service to our readers.

Political Parties Will Differ

Democrats have been working two years, with strong influence from Westerners, on plank to be presented soon

With the 1960 Presidential nominating conventions at hand, there is once more heard in the land the quadrennial cry for both parties to hammer out strong platform statements on natural resources—especially water and power development.

Democratic partisans of bigger federal participation, on a grander scale than ever before, clearly hold the upper hand at this stage in the publicity and pressure campaigns, aimed at influencing the platforms.

Who's going to be in charge and what are the planks on resource development likely to sound like this year?

One of Two Westerners for Demos

Rep Chester Bowles of Connecticut, a "liberal" by all the commonly accepted definitions of that word, will be chairman of the Democratic platform committee. The identity of the chairman of Bowles' special subcommittee on resources is not known, but it may be C. Girard (Jerry) Davidson, former assistant secretary of Interior and a TVA attorney during that agency's formative years.

If not Davidson, an Oregonian, then it could be Sen Ralph Yarborough of Texas.

Both have been active in this field recently. Davidson is chairman of a newly-formed party advisory committee on natural resources, an arm of the National Democratic Committee. Yarborough presided in Denver May 27 at a regional preliminary hearing designed to obtain opinions on what would constitute a strong plank in 1960.

Seaton Seen as GOP Policymaker

On the Republican side, the situation is less clear. Charles Percy, a young Chicago industrialist, is to be chairman of the platform committee. His vice chairman will be Rep Melvin Laird of Wisconsin, a political "conservative."

Whether there will be a special subcommittee on resources at the GOP convention is not even certain, but it is clear that the prime influence on this particular section of the platform will be Interior Secretary Fred A. Seaton— after, of course, the obvious most influential of all the Republicans this year, Vice President Richard M. Nixon, the Presidential nominee-apparent.

In any event, the point is plain: Seaton on the Republican side and Davidson or Yarborough on the Democratic side are the persons of influence, worthy of wooing at this time by interested persons desiring to put a viewpoint into the political mill.

Plank Writing Time Is Near

Here's the timetable for platform preparation:

- Democrats, Los Angeles, beginning July 5. The actual nominating convention begins July 11.
- Republicans, Chicago, July 18. The convention's formal opening is a week later, July 25.

As a practical matter, any political platform is generally a document to—in the words of one professional politico—"read once, file away and refer to again only where it suits the need of the moment." But in the field of resource development, perhaps as sharply as in any other area, a comparison of the platforms shows a clear difference between the Republicans and Democrats. This has been true in the past, and it will be true again in 1960.

A highly-placed Republican national strategist says his party, on most issues and including this one, probably will stick fairly close to

Policy Leaders for the Democrats . . .

BOWLES

YARBOROUGH

DAVIDSON

on Water Resources, Power Policies

the 1956 platform line and to the 1959 report of the "Republican Committee on Program and Progress" which was, incidentally, prepared under the direction of Percy.

The 1956 GOP platform, in some of its key points, plumped for "partnership"—"we commend the Eisenhower Administration for encouraging state and local governments, public agencies, and regulated private enterprise to participate actively in comprehensive water and power development. In such partnership we are leading the way with great federal developments such as the Upper Colorado Project and with partnership projects of great importance . . ."

The 1959 so-called "Percy Report" hews closely to that line, and it is one that Seaton and Nixon will want to stay close to, by all appearances, in the coming campaign.

"In the marketing of federally produced power we support preference to public bodies and cooperatives under the historic policy of the Congress," the Republican platform said, a statement mainly notable for the fact that in the entire field it was the only place where Democrats and Republicans agreed on basic policy. In atomic energy development, the 1956 platform and the 1959 statement of policy advocated heavy emphasis on private development of atomic power.

Demos Will Stick to 1956 Plank

What the Democratic Party said in pertinent parts of its 1956 platform is being re-echoed again now by persons advising both Davidson's and Yarborough's task forces.

"We pledge the resumption of rapid and orderly multi-purpose river basin development throughout the country . . . (to) materially aid low cost power, navigation, recreation, fish and wildlife propagation and mineral development," one key section proclaimed. These are some other samples:

"We pledge . . . aggressive programs to provide abundant supplies of low-cost energy, including continued research for the development of synthetic liquid fuel from coal, shale and agricultural products . . . we will carry forward increased and full production of hydroelectric power on our rivers . . . we shall once more rigorously enforce the anti-monopoly and public body preference clauses, including the Holding Company Act, administratively circumvented by the Eisenhower Administration, and we shall preserve and strengthen the public power competitive yardstick in power development" of all kinds, including atomic.

Davidson was a leading figure in a resources program adopted four months ago by the Western States Democratic Conference in a meeting at Albuquerque, N. M. (EW, March 21, p 66).

Words Used but No Definitions

Among other things, it declared "comprehensive, balanced multiple purpose plans are needed for each major river basin with periodic revision in the light of changing needs."

The same policy paper also held that "regional wholesale power supply systems, operated . . . through the cooperation of private, federal, local public and cooperative electric utilities should be fostered to provide low cost power to all retail electric systems and to bring to the homes, farms and industry of every region the great benefits of low-cost electricity," and it added:

"As important elements in these . . . systems, the Democratic party would resume the vigorous comprehensive development of our invaluable hydro resources, now three-fourths undeveloped, and establish a useful program for the early achievement of low-cost atomic power."

'Giveaway' Talk Will Come Up

This sort of approach, coupled with the dead-certain denunciations of Republicans for the "Hells Canyon giveaway" and "attempts to kill TVA," is the stuff of which the Democratic resources plank will be built in this presidential year.

Yarborough is not so far along as Davidson in his own exploratory work on the platform but his inclination is clear. The Texan says the Democrats have to have a "plank that will not be just a bunch of platitudes and vague promises" and "the best illustrations of the deplorable and disgraceful neglect by the Administration is the building of small dams on the Snake River in Hells Canyon, which are taking the place of badly-needed multiple projects of benefit to all the people. This is a giveaway to private interests. . . ."

. . . and for the Republicans

SEATON

PERCY

DAN BRAYMER IN EUROPE—I

Profile of Holland: Windmills

In his first report from Europe, EW's Dan Braymer makes electrical tour of Holland; finds Dutch load and kwhr output growing 7% a year and interties with West Germany

Holland still has its windmills. But today its 25 generating stations, linked by two interconnected 150 and 110-kv transmission loops, provide 3,600,000 kw of power for its industry, commerce and agriculture.

Except for Amsterdam's municipal power system, Holland's ten utilities are provincially owned. But they are combined for operating purposes into a mutually owned association called SEP that coordinates their interconnected operations.

Peak loads in Holland come in winter, and last December the national peak was 2,578,000 kw on a noncoincidence basis against a generating capacity of 3,600,000 kw. Both peak loads and energy production are growing at about the same rate, a little over 7% per year, and to meet it the Dutch Electric Supply utilities expect by the end of 1960 to have a generating capacity of 4,300,000 kw, most of it in thermal generation.

While the Dutch utilities are provincially owned, they function in many ways like private utilities with very little governmental interference or participation in their operation.

Amsterdam with its population of about 800,000 is supplied by the country's only municipal-owned utility and has a peak load that is about one-tenth that of the country as a whole or about 275 megawatts. Amsterdam's two generating stations have a total generating capacity of a little over 300 Mw. The newest station, Hemweg, put in service in 1954, has about 220 Mw of capacity in four 55-Mw machines.

Two Loops Link Stations

The Amsterdam plants are like the other principal generating stations of each of the provinces; they are linked together by two transmission loops. The smaller is a 110-kv transmission loop in northern and eastern Holland; the other, a much larger loop in southern and western Holland, links plants in the major industrial provinces of the south and west. These two loops, the 110-kv to the north and the 150-kv to the south and west, are tied together by a 150-kv line.

The exchange of power between the members of SEP is coordinated by its staff from a dispatching headquarters located at Arnhem which also coordinates the interchange of power to the east with German and to the south and west with Belgian utility systems over 220-kv transmission ties.

Today, with the generating capacity and peak loads of the Dutch utilities increasing, the immediate job facing the provincial utilities is to split the 150-kv network into component loops by the construction of 150-kv ties between major sources of generation. This is proceeding at the present time with the construction of a line linking Rotterdam stations with Utrecht to the north and east and with a second line linking Geertruidenberg station with a substation at Dodeward.

These two ties will break with the 150-kv loop into three component loops holding down short-circuit duties on existing switchgear.

Definitely in prospect and under study by the Dutch Provincial Utilities and the West German Utilities is a regional transmission interconnection that would tie West Germany's 380-kv transmission with the Dutch network, and so make it possible for thermal power from Holland's coal-burning steam plants to be exchanged freely with hydro generation from Switzerland and the south of Germany. While such a regional interconnection is still un-

Our Man on the Continent

A farewell wave from the steps of an Amsterdam-bound plane, and ace engineering editor Dan Braymer signals another stage in Electrical World's campaign to intensify overseas technical coverage.

During Dan's seven-week working trip, he'll visit Amsterdam, Arnhem, Essen, Cologne, Frankfurt, Zurich, Geneva, Lisbon, Paris, London and points between. He'll cover the World Power Conference in Madrid and the CIGRE meeting in Paris.

Here you see the first fruits of Dan's trip in his article on the Dutch power system. The coming weeks will bring more.

But this type of story isn't the real reason behind the trip. Over a year ago, we decided much more overseas engineering coverage was mandatory. Finding a fine British free-lance technical man, we first put him on retainer. Now Dan is making and reinforcing contacts, and setting the stage for future articles in depth.

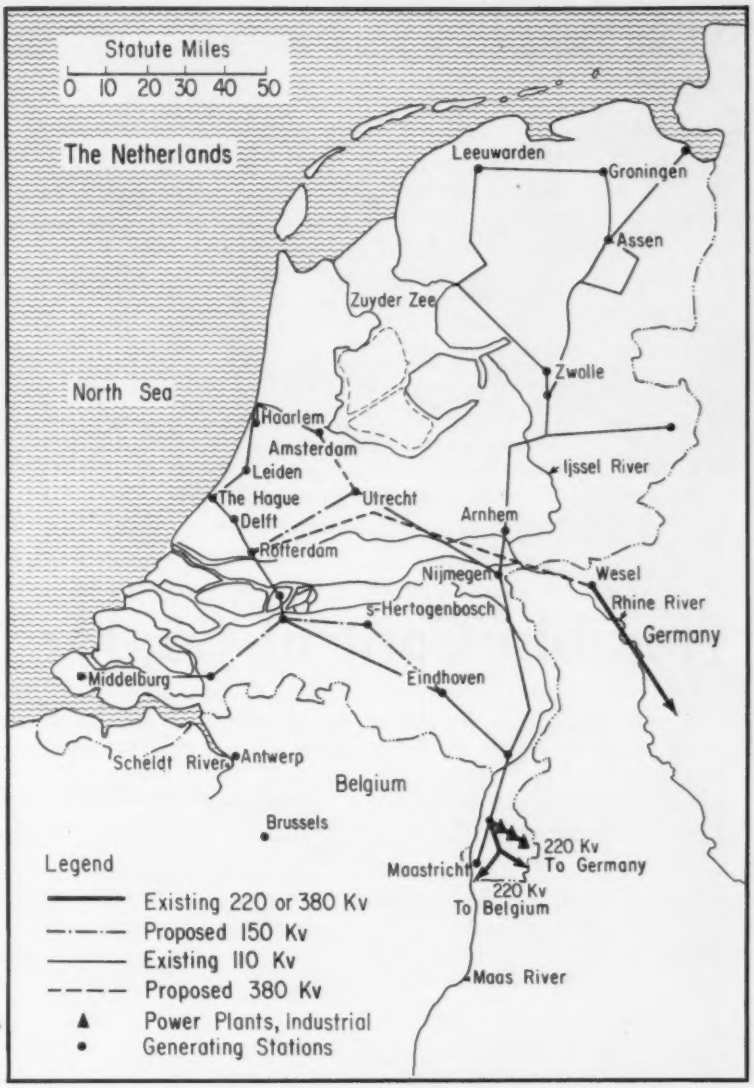
The world is getting smaller; paradoxically, Electrical World proposes to get larger.

and Kilowatts

der study and perhaps as much as four to five years away, transmission right-of-way has been reserved for a double-circuit tower line of 1,200 Mw capability running west of a point near Wesel in Germany across the Dutch border to a point near Nijmegen then west to a point south of Utrecht. Here the 380-kv circuit would fork, running north to Amsterdam and south and west to Rotterdam where it would tie in with major sources of generation.

Planning and coordination of the interconnection between Germany and the Netherlands is being done by officials of SEP working closely with officials of the German RWE.

The 380-kv double-circuit line envisioned by the German and Dutch utilities would have quadruple bundle conductors arranged on each side of the tower in a delta configuration. Tower heights would be 169 ft with a single overhead ground wire. This construction contrasts with the Dutch 150-kv tower construction which involves tower heights of 96 ft and three overhead ground wires, one on the peak of the tower and two at ends of top arms.



INTERCONNECTIONS with West Germany and Belgium are at 220 kv, but 380-kv interties are being studied

Second Major Utility Sells Out in Mexico

Complete nationalization of Mexico's electrical industry is probably in the immediate offing. A Belgium group, Sofina, which owns 40% of the outstanding shares of Mexican Light & Power Co, is selling them to "undisclosed Mexican interest." A strong indication that the "Mexican interest" is the Mexican government is in the fact that the government is rapidly buying shares from other owners.

Purchase of Mexlight, coming only a few weeks after the government's purchase of American & Foreign Power's utility, would place all but a small fraction of the country's electrical industry under government ownership or control.

Although Mexlight shares were valued at about $15 for common only a few weeks ago, Sofina is selling for $20, and the government is paying the same to other owners. Under terms set forth in Sofina's sale agreement with the "undisclosed Mexican interests," this was stipulated. Preferred price minimum is $13. There are some 2.38 million shares of common and 850,000 shares of preferred stock outstanding.

Total price for the company will eventually be about $60 million. Mexlight has assets in the neighborhood of $300 million, but has extremely high bonded and other indebtedness.

At a recent Mexlight stockholders meeting, Chairman Gen Maxwell D. Taylor said earnings per common share were considerably lower than usual from operating electric utilities, which placed Mexlight in a bad position in the money market for new capital.

An application for a rate increase to correct the situation was made about a year ago, but is still pending. A similar situation preceded the sale of A&FP holdings.

AUTOMATIC CONTROL is a key feature of the new control center. It manipulates 22 of the 37 generators in the system by means of a schedule prepared each day on a digital computer; regulates frequency bias and offset

Flexible Control Center Installed

A new electric load dispatching center placed in service by Public Service & Gas Co, Newark, N. J., is reported by the company to be the largest of its kind in the United States.

The panel board, which is 10½ ft high and 210 ft long, controls about 80% of the company's 2,864 Mw of capacity.

Not only present dispatching is provided for. The facilities are designed to accommodate anticipated system growth for the next 25 years.

Three basic components make up the control center. First is a graphic panel with diagrams representing generating facilities and the system. The diagrams are laid out with tape so future changes can be made.

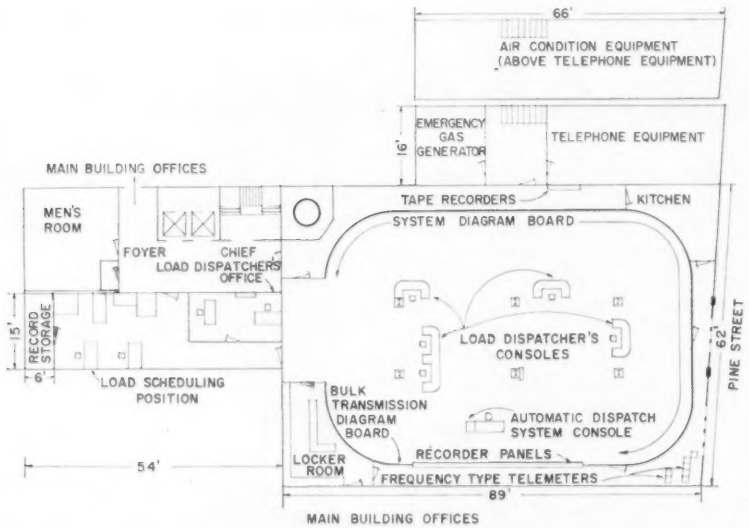
There are five dispatching consoles, three of them manned at all times, and one double sized supervisor's console. There is also an automatic dispatch console.

Third in the group of components is the instrumentation, which allows operators to see changes in system generation and tie-line flow caused by the automatic load control equipment. Weather changes can be observed as they occur.

The consoles are connected to seven generating stations, 75 substations eight company PBX boards, 15 switching stations, three interconnected companies, the Terminal Building (where it is located) dial system, and the New Jersey Bell Telephone system.

The telephone turrets on the consoles consist of five 20-line sections of equipment similar to that of the telephone company. Five of the consoles are bridged so all incoming calls can be received at any position. An additional 80-line position, which excludes substation communication, overlooks the meter panels. This is used for gathering data from various points in the system for daily records. A 20-line unit in the adjacent office area is used mostly for interconnected company communication.

All verbal communication in and out of the center is recorded on magnetic tape, which is later edited to select stored information.



TOTAL AREA OF THE CENTER is 8,200 sq ft, with 7,000 sq ft air conditioned and with humidity control. Some 1,200 fluorescent fixtures give 200-ft-c light

Interior Plan on Upper Colorado Challenged

Sen Frank Moss (D-Utah) has complained twice—in a letter to Interior Secretary Fred Seaton and in a speech on the Senate floor—over the lack of a proposed major transmission line from Glen Canyon Dam into central Utah, to serve preference customers.

Specifically, Moss called on Interior to recommend a line from Glen Canyon to Heber, Utah. He said the lack of such a proposed line would be "out of principle" from the Department's original recommendations on power marketing, made in January.

Interior's proposed high-voltage lines, connecting major Upper Colorado projects, bend east, generally, from both Flaming Gorge and Glen Canyon Dams, connecting on a north-south axis through western Colorado. Moss would prefer them to be connected along a north-south line farther west—in Utah.

Moss claims the northward connection from Glen Canyon is needed to serve Utah preference customers —about 200,000 of them. Their present demand is 100,000 kw, and will grow to 280,000 kw by 1980.

Moss's complaint does not take into account the fact that Utah Power & Light Co is going to complete, in 1964, a 230-kv line from near Glen Canyon to Salt Lake City. E. M. Naughton of UP&L said 70 miles of it are completed now. It will be an intertie with Arizona Public Service Co as well as available for interconnection with Glen Canyon and wheeling to preference customers in Utah. It will have a capacity of not less than 175 Mw.

Also, UP&L has completed a 138-kv line from Sigurd to the southern part of the Telluride Power Co system, and it interconnects with a California-Pacific Power Co line from that point to Cedar City.

Naughton said construction has already started on a line from UP&L's Carbon Plant, near Helper, to the Unitah Basin. The 138-kv line ends very near Flaming Gorge, and UP&L is willing to build the rest if necessary.

Because utilities' loads can be served by the lines, as well as preference customers, there will be economies that will result in direct savings to customers vs underloaded federal lines, Naughton pointed out.

It is pretty well known that the Bureau of Reclamation transmission plan presented last month is more for creating "postage stamp" rates than a practical, working plan, which is apparently another oversight on the part of Sen Moss.

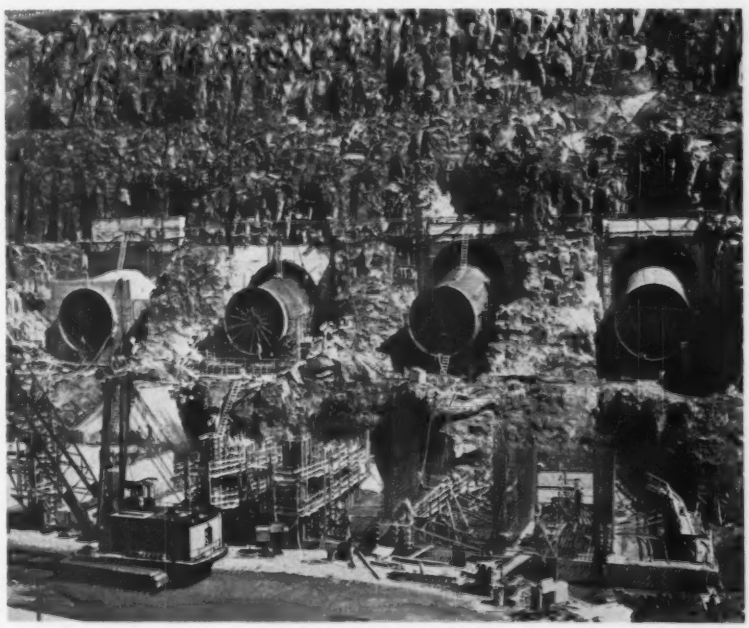
Naughton predicted that it will be hard for appropriations committeemen to justify federal construction of transmission lines with the private companies' lines already there, or definitely planned.

Tentative Line in Interior Plan

Interior sent its proposals for major transmission lines to Congress in May (EW, May 23, p 64). At that time, a 138-kv line was listed as possible between Glen Canyon and Sigurd, Utah, but no definite plan was advanced for a line to any other point in the state. These proposed lines—aside from several federal "backbone" lines—would be up for grabs, to be built by federal, preference or private systems.

Moss Promises to Give Battle

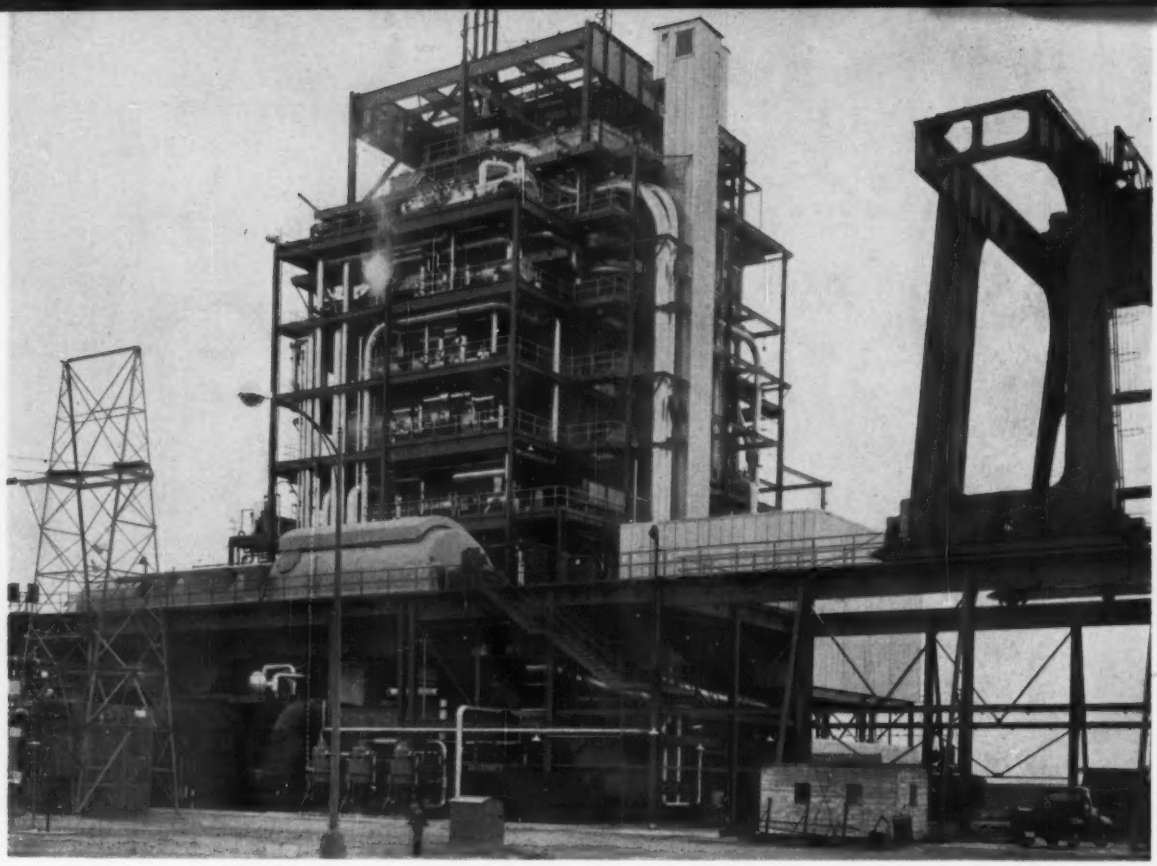
Moss said, in retaliation to the Interior plan, that he expects to "follow up in whatever way necessary" to develop a plan to provide Upper Colorado power to Utah preference customers. He referred to the need to reduce electric power requirements from older, less efficient hydro power plants on tributaries in Utah's Great Basin. "Regrettably," he added, "many of these plants are generating electricity by passing water that would be far more valuable to the state and the nation if it were stored for higher use: human, agricultural or industrial uses."



Oxbow Powerhouse Begins to Take Shape

Rising from bedrock at the base of a sheer cliff is the powerhouse of the Oxbow Project of Idaho Power Co. When completed, the powerhouse will be 295 ft long and 80 ft high, and will contain 200,000-kw of generating capacity.

Penstocks jutting from the cliff will feed water to the four initial generating units from two 1,000-ft intake tunnels.



Outdoor Reheat Plant Costs $93

W. H. McALPIN, Engineer, Dallas Power & Light Co, Dallas, Tex.

Minimum plant construction and operating expenses were achieved aims for Dallas Power & Light Company's new North Lake steam station. The 175-Mw first unit has an installed cost of $93 per kw.

Outdoor construction and elimination of the spare feed pump are among the measures of the Ebasco Services design which contribute to low construction cost. Lower operating expenses are expected from use of reheat to save fuel and from extensive use of automatic controls to reduce labor. Installed cost of this first North Lake unit, which went into commercial operation in December, compares with $87 per kw for previous 125-Mw units without reheat. This $93-per-kw figure does not include costs of property development or of a machine-made lake, which holds enough cooling water for the ultimate 800-Mw capacity at North Lake.

Most of the equipment is outdoors, as seen in the photo, and has suitable weather protection. An exception is the generator exciter, which has a walk-in weather housing to allow access to slip ring and commutator brushes during bad weather. Experience indicates that the walk-in enclosure for the exciter is preferable to weatherproof lagging.

Natural Gas Is Primary Fuel

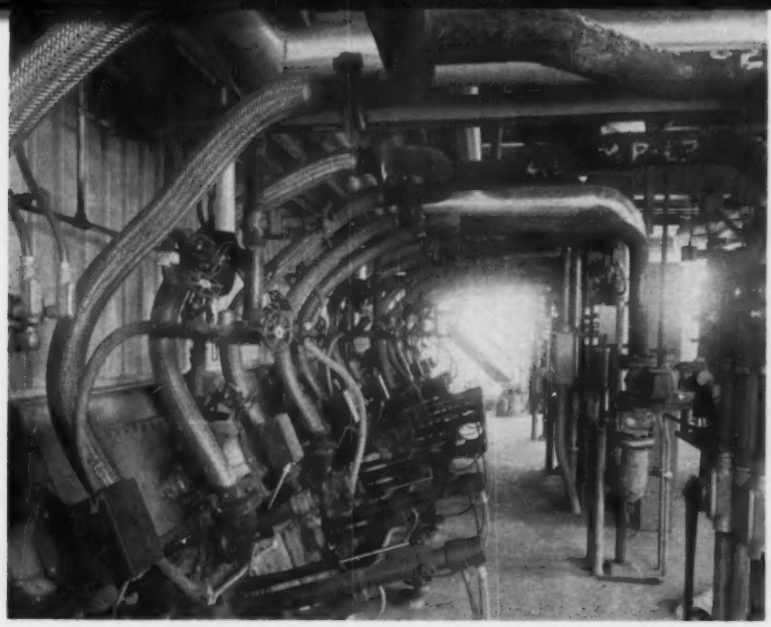
The station is designed on the unit system with only minor connections between units. The second unit, similar to this first one, will begin operation in early 1962. The 1,800-psig, 1,000/1,100F turbine is a tandem-compound, double-flow reheat type. It has bottom exhaust with the low-pressure heater in the condenser connection. The generator is rated 221 Mva, 13.8 kv, at 30 psig hydrogen.

The boiler burns natural gas as the primary fuel in its pressurized turbo furnace, with oil as standby. Main steam pressure is 2,030 psig.

Auxiliary steam is taken at 150 psig directly from the boiler through a reducing valve. This scheme was also more reliable and economical than tapping the main steam line to the turbine and running through a reducer to a desuperheater.

Savings estimated at $200,000 resulted from installing two half-capacity boiler feed pumps instead of the three which had been Dallas P&L's practice. The reliability of available horizontal feed pumps was a significant factor in this choice. Each pump is driven by a 2,500-hp, 4-kv motor through a variable-speed hydraulic coupling. This provides a range of 60% to 100% of 3,480 rpm. Corresponding discharge pressures vary from 1,000 to 2,700 psig and flow rates, 160 to 1,550 gpm.

Water capacity of the boiler is small relative to maximum steam output. Accordingly the use of two



AUTOMATIC CONTROL helps save on personnel. It checks each burner operation sequentially, supervises continuously, cuts out burners on flame failure

OUTDOOR CONSTRUCTION and dispensing with standby feed pump helped Dallas P&L to erect this 175-Mw unit for $93 per kw. Next unit will cut more corners with horizontal condensate pumps and demineralizer equipment

per Kw

boiler feed pumps instead of three poses an operating problem. A high load must be reduced rapidly in case a pump is lost. Automatic control has solved this problem by balancing steam flow against feed pump capacity. If an excess of feedwater is not available, the unit's load is reduced to what one pump can handle.

Accent on minimum attention to equipment by operating personnel has called for a maximum of such automatic controls. Most of them remove malfunctioning equipment from service, permitting operators to investigate when time allows. Four men per shift will operate the first two units, both 175 Mw. Six men will handle the ultimate 800-Mw four-unit plant.

Instruments and controls for all units and transmission lines are brought to one central control room to concentrate station intelligence. Low-voltage and pneumatic devices are used. This center now accommodates control panels for two units, but will be extended for the two final 225-Mw units. It stands at the turbine operating level and is fully air conditioned.

A combination control cubicle gives the operator supervision over boiler, turbine, generator and auxiliaries for each unit. Recording instruments and generator and transformer relays are mounted on the back of each. Transmission line panels are located opposite these cubicles.

Plan Changes for Second Unit

Operators supervise boiler water level by one gage glass and a manometric level indicator. One of the latter is just outside the control room for direct viewing. A 108-point monitoring temperature recorder aids controlled starting and monitors important equipment temperatures during operation.

Rotary vacuum pumps for air evacuation of the condenser eliminate the maintenance of condensing equipment required with steam jets. They provide flexibility of operation during starting when steam pressure requirements vary, and adapt readily to remote control and automatic operation. Unit 1 has two vacuum pumps, one with a capacity of 6.25 cfm and the other 3.2 cfm at one inch Hg absolute. The larger pump was installed for large-capacity requirements during unit starting. The smaller, however, has ample capacity for hogging and running conditions. Hence two of the smaller pumps are planned for the second unit.

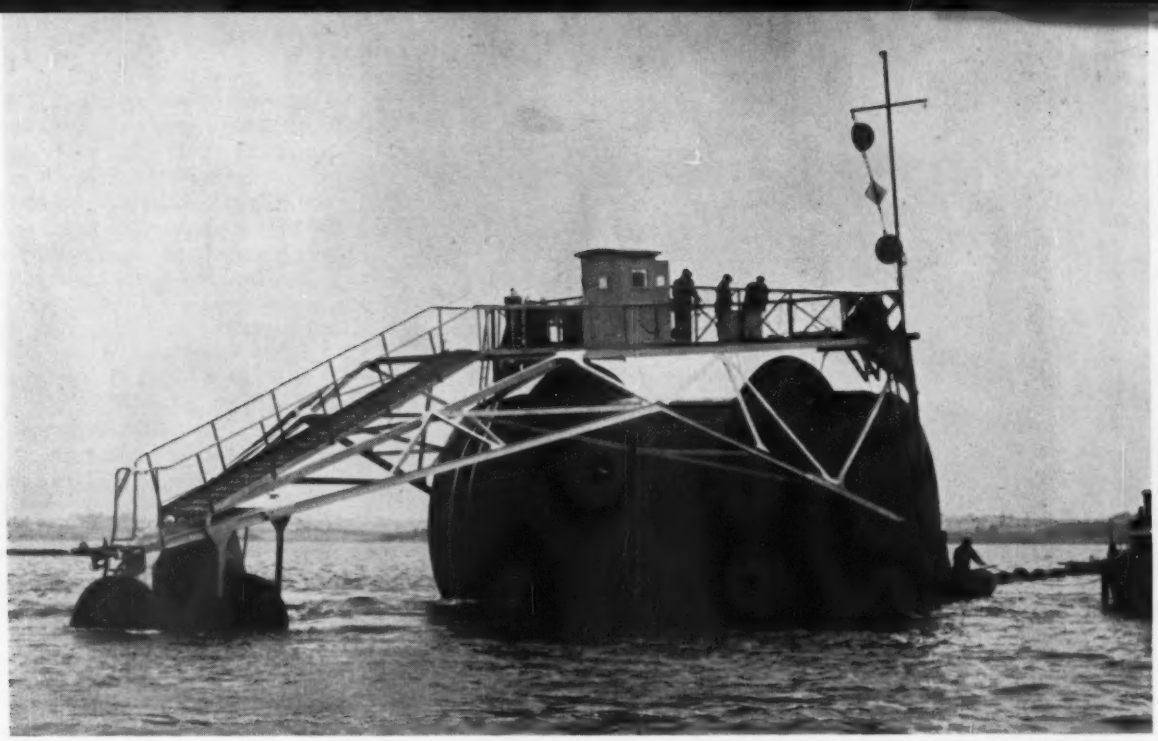
Other refinements are planned to further reduce the installed cost of the second 175-Mw unit. Two half-capacity horizontal condensate pumps should give reliability equal to that of the three vertical pumps of the same capability now serving Unit 1. They deliver 1,200 gpm at 620 ft total differential head. The savings realized will be about $30,000—plus maintenance savings.

Large 4-kv motors in semi-protected areas will have drip-proof housings and silicone compound insulation for longer life and greater overload capacity. Circulating water valves at the condenser inlet and outlet will be omitted because condenser trouble in Dallas P&L plants has been practically non-existent. Rotary air compressors instead of the first unit's reciprocating compressors will supply pneumatic instruments in Unit 2 to reduce maintenance expenses.

Strict water purity requirements and growing confidence in the reliability and ease of operation of the demineralizer prompted its selection for feedwater treatment of Unit No. 2. This will yield a savings over the solium zeolite softeners serving Unit No. 1. An evaporator supplies make-up feedwater for Unit No. 1.

There was no suitable plant site in the area with a continuously available supply of cooling water. Hence the builder created an artificial lake large enough to furnish cooling water for the ultimate 800 Mw. Two pumps, one of 10,000 gpm and the other, 20,000 gpm supply the lake through a 42-in concrete pipe from a Trinity River tributary 2¼ miles away.

The terrain called for a dam and dike to gain the needed water storage. The lake's capacity is 17,100 acre ft with a maximum surface area of 800 acres. Station grade is half way between high and low water levels, which differ by ten feet.



Floating drum laid 1¼ miles of submarine cable in one day. It also transported . . .

Tailored 'Boat' Lays Cable

JOERGEN JOERGENSEN, Northern Cable and Wire Works, Copenhagen, Denmark

A power company, cable manufacturer and seagoing salvage company teamed up to make a one-day job of laying a 1¼-mi cable across a fjord in southeast Denmark. At 170 kv this is the highest-voltage three-conductor submarine cable. But star of the day was the cable company's floating drum shown above.

This seagoing craft, built by Northern Wire and Cable Works especially for operations like this one, assumed the bulk of the duties. It not only put down the biggest stretch of the lay, but, under tow, transported the cable the 175 mi from the factory in Copenhagen to the installation site at Kolding Fjord.

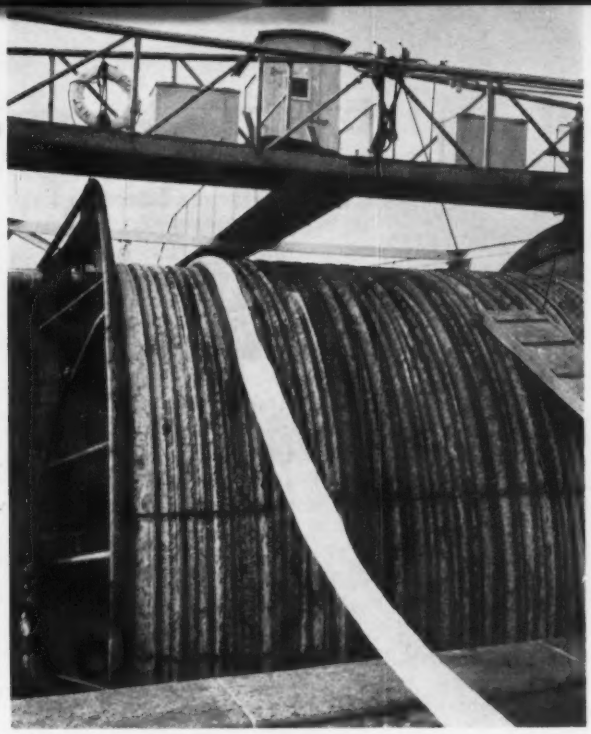
The laying job was done between sunup and sundown. The floating drum was towed to a spot 2,000 ft from the northern shore. A winch ashore pulled the cable from the drum. During pulling the cable was supported every 15 ft by a pair of empty oil barrels.

During the second phase, the salvage company's 300-hp boat towed the floating drum toward the opposite shore, while the drum paid out cable. A smaller boat kept position against the channel current. A brake system controlled unreeling speed from the drum, stress on the cable and its slack in the water. 3300 ft were laid this way in an hour and a half. The last 1600 ft were laid in a manner similar to the first part. Cable was laid across floating barrels, strung parallel to the beach, then hauled to shore by winch.

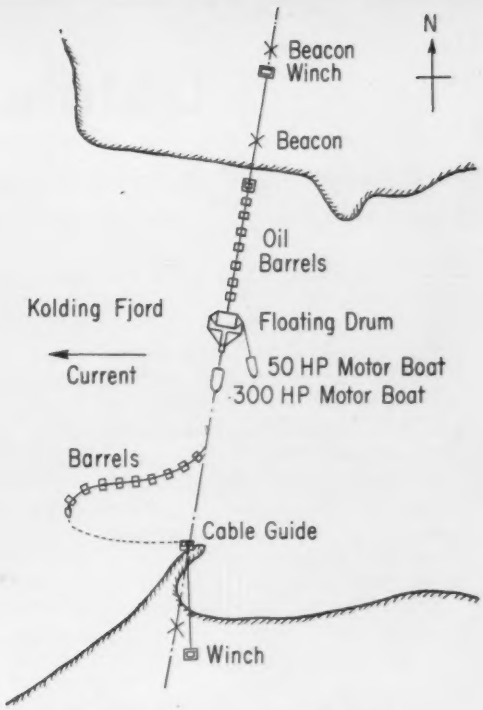
The lay was made in serpentine with 5% surplus cable because of the thick layer of bottom mud. The operation was directed from the floating drum with the aid of portable voice radio.

Cable-laying from the floating drum imparted gentler treatment to the cable than would laying from coil on shipboard, as it eliminated simultaneous torsional and bending stresses. The drum's 20-ft diame-

◀**SPLICES** were made flexible and slim for reeling onto the floating drum



spliced cable from Copenhagen docks to . . .



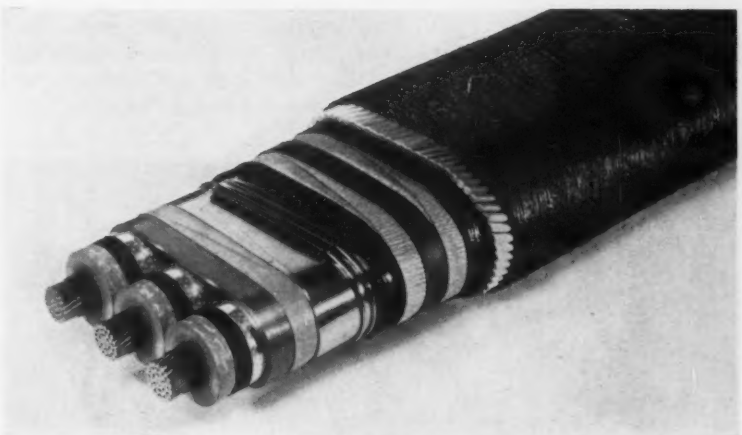
installation site at Danish fjord

Gently and Fast

ter was great enough to permit on-reeling of splices, as the above photo shows. Drum length is 36 ft. Its capacity is 300 tons of cable, triple the load it handled here.

Flat type cable construction was selected because of its suitability for three-core submarine use, even at high voltage. The cable was manufactured in four 1650-ft lengths, which were spliced before shipping. Junction ferrules for joining conductors were the same size as the wire. A flat corrugated copper tube was slipped over the splice and wiped to the lead cable sheath. Heavy corrugated bronze strips reinforced this tubing, and armor wire and corrosion protection went over all. Cable ends were frozen with CO_2 while the splice was oil filled. Splicing and on-reeling took about three weeks.

The flat sides deflect outward when the oil expands with temperature rise. This action eliminates longitudinal flow of oil and the need for membraneous tanks at the terminals. The corrugated strips insure that the deflection is elastic and that the cable will regain its original shape upon contraction.



Moelleroej Submarine Cable Data

Voltage	170 kv
Power capacity	215 Mva
Conductor size	310 sq mm (612 MCM)
Outside dimensions	4.42x7.09 in.
Length	1¼ mi
Weight	32.4 lb per ft
Insulation	0.51 in.
Armor wire	0.203 in. dia

Construction, from inside out:
Stranded copper conductor
Oil-impregnated paper insulation
Lead sheath about all three phases
Two layers flat copper tape, wrapped
Double layer corrugated bronze strip
Two copper wires binding bronze strip
Corrosion protection wrappings
Galvanized steel armor wire
Jute protection

Distribution to Trailers Can Be

Park owners make choice, but selection of underground involves paying the costs of trenching and backfilling

E. C. DE BAENE, Detroit Edison Co, Detroit, Mich.

Underground as well as open-wire distribution is made available to trailer parks by Detroit Edison Co because of these difficulties encountered with the latter:

1. Too many service drops clutter poles.

2. Troublesome clearance between power and communication facilities on the same pole.

3. Proximity of primary lines to television antennas.

4. Space limitations for pole guying.

5. The cost and unsatisfactory nature of specially designed pedestals for terminating service drops.

Of the two new distribution plans made available to trailer park owners, one consists of overhead primaries and secondaries; the other, of an underground system. For both plans, the trailer park owner supplies service cables from the company-provided secondary terminating facilities.

The underground plan gained much acceptance during the past year. Under it, the trailer park owner does all trenching and backfilling. He also erects a service cabinet at each trailer.

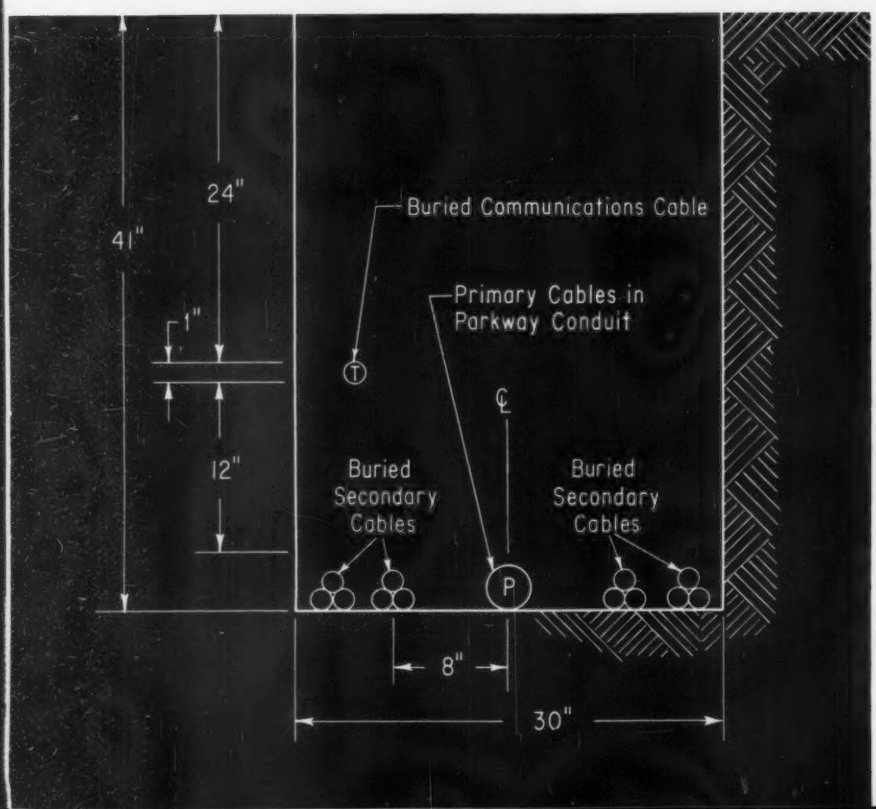
Detroit Edison supplies single-phase primary facilities, either 13.2 or 4.8 kv. Cable poles have lightning arresters and fuses, and primary cables are either No. 2 or No. 4, single-conductor rubber and lead suitable for the operating voltage. Primary cables are enclosed in heavy-wall fiber ducts buried without concrete encasement about 42 in. below grade. Transformer facilities, supplied by the utility, are pad mounted.

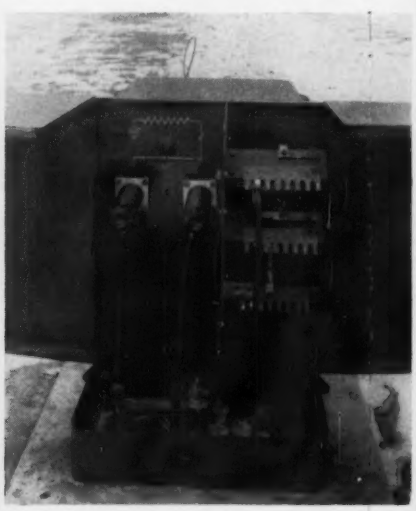
The concrete pads, 40 in. square and 6 in. thick, are fitted with fiber sweeps to ease cable draw-in. The pad-mounted transformers, not commercially available, are self-protected and equipped with a special secondary rack and a sheetmetal enclosure for primary and secondary terminals.

Circuit layouts for primaries, secondaries, and services are provided by Detroit Edison. Primary feed usually emanates from two separate cable poles. Feeders loop in and out of the transformer cubicles, and there is an open sectionalizing point at about the middle of the primary circuit. Each primary is designed to handle the entire circuit load under emergency conditions.

Detroit Edison provides and installs primary cables, and the park owner the secondary and service cables. Secondary and service cables are single-conductor rubber and Neoprene of USE type, rated for 600 v. They are sized for acceptable voltage drop limits on the assumption of a 5-kva demand at the meter. Service cabinets, adjacent to each trailer, provide a meter outlet, master fuses, and a communication service outlet. The owner supplies the cabinets.

Only estimated costs of the two plans are available now; they pertain to overhead and underground sys-





TRANSFORMERS are pad-mounted and all terminals have enclosures

UNDERGROUND PRIMARIES are in wall duct, secondaries share trench

Open Wire or Underground

tems planned for eight trailer parks in 1959. The parks varied from 29 to 253 lots, each about 30 ft wide. The ratio of the estimated cost of the underground to that of the overhead system ranged from 0.68 to 1.56, the average being about 0.9.

Preliminary actual cost figures developed in studies for the first few underground installations exceed the estimates, as might be expected. As more on-the-job experience is gained, actual cost figures should approach the estimates. Besides improved appearance, the underground system has these advantages:

1. Improved service continuity.

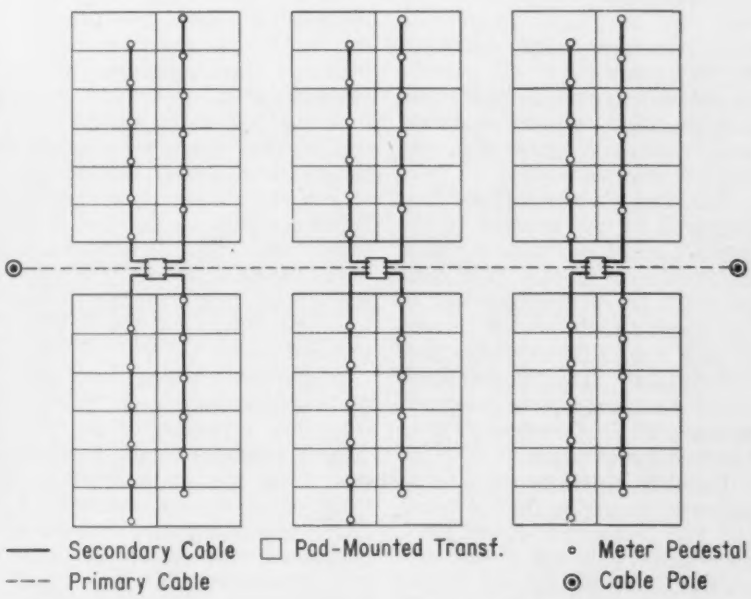
2. Problems and damage caused by the frequent arrival and departure of large house trailers have been practically eliminated.

3. The cable affords better voltage regulation than the open wire.

Today Detroit Edison's service to trailer parks consists of either all underground, or overhead primaries with secondaries and service underground. Formerly, it served trailer parks with completely overhead facilities — primaries, secondaries, and services.

UNDERGROUND DISTRIBUTION is neat in appearance and provides better service. Service cabinets are so placed that they are adjacent to the trailer itself

SERVICE CABINET provides a meter outlet, master fuses, and communication service outlet. Such underground service eliminates cluttered pole lines



PRIMARY FEED emanates from two separate cable poles, feeders looping in and out of transformer cubicles. Primary has open middle sectionalizing point

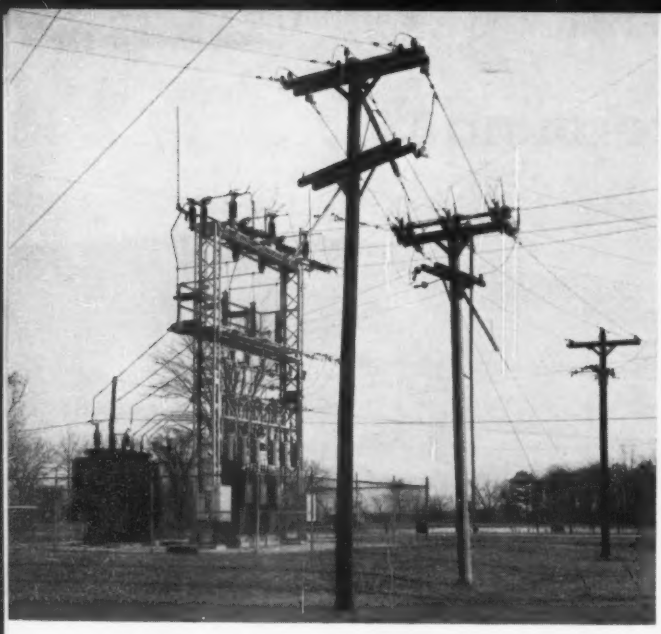
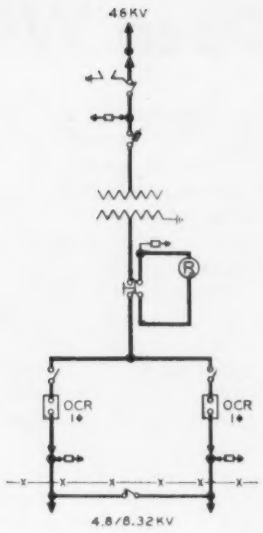


FIG 1—TWO-COLUMN SUBSTATIONS were planned for 750 to 5,000-kva sizes during the program



SINGLE-TRANSFORMER SUBSTATIONS of this type followed the plan shown as Fig 1, 88 substations being built thus from one electrical layout in four-year construction period

Design Permits Substations

Reduces Consumers Powers investment losses—estimated savings amounting to $100,000 per completed substation

R. E. ALBRECHT, General Engineering Department,

R. R. BLANCHARD, General Engineering Department, and

H. G. DARREN, Electric Operations Department, Consumers Power Co, Jackson, Mich.

A substation design, developed by Consumers Power Co, permits step-by-step expansion with the least possible disturbance of existing parts as succeeding portions are built.

The design's development was prompted by the prospect of the system's substations acquiring loads of 20 Mva or greater. The company sought to minimize loss of investment and the cost of changes as each step in the expansion program is taken. The design is based on the Erecticon-type of substation structure which Consumers Power has used for 15 years.

Formerly, distribution substations permitted expansion from 750 kva to 5 Mva. Between 1946 and 1957, the company built 400 of these substations, using the original Erecticon design. Of these, 88 were built from one electrical layout in a four-year period.

This two-column structure has a 46-kv air break switch, fuses, lightning arresters, a 46-4.8/8.32-kv, 3-phase transformer of 750 to 5,000-kva capacity, an 8.32-kv bus, single-phase regulators, regulator by-pass switches, and distribution lightning arresters. Distribution circuits were protected by single-phase oil circuit reclosers on the structure.

A variation of the standard design specified switch cubicles containing an oil circuit breaker and an external disconnect and by-pass switch assembly. A distribution tie switch was mounted on a wood pole in the street right-of-way. This design was adequate through a system load growth from 600 Mw in 1945 to 1,600 Mw in 1957.

In developing a design for a simple, low initial investment "growth" substation, expansion of the two-column structures to the four-column design was the objective. Removal of two-column structures for future growth according to another plan would incur the loss of previous investments in labor and material and involve operating problems in maintaining service continuity during construction. The new design allows expansion of an installed two-column structure, or the installation of a new basic substation, suitable for development into a major distribution substation.

Distribution ties outside substations were increasing in cost. Growing system short-circuit currents called for more space for switchgear having greater interrupting ability. Labor and overhead costs were mounting also.

Drawings Standardized

Any design had to remain flexible so that the same type of drawings could be used for many substations in standardized construction procedures, thus reducing engineering time and labor costs. In the new design, foundations are usable for further expansion, so that reclosers and regulators can be replaced or added at minimum cost.

The first four-column distribution substation was built in 1957. Since then, 12 have been built. Four were additions.

Distribution circuit characteristics, in some instances, indicated the need for separate circuit regulation. Regulators were specified for the load side of the oil circuit reclosers, this arrangement affording better substation reliability, as one regulator failure interrupts only one circuit.

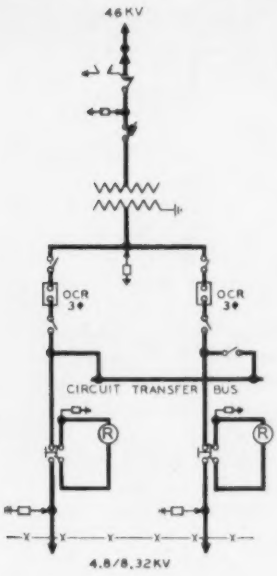
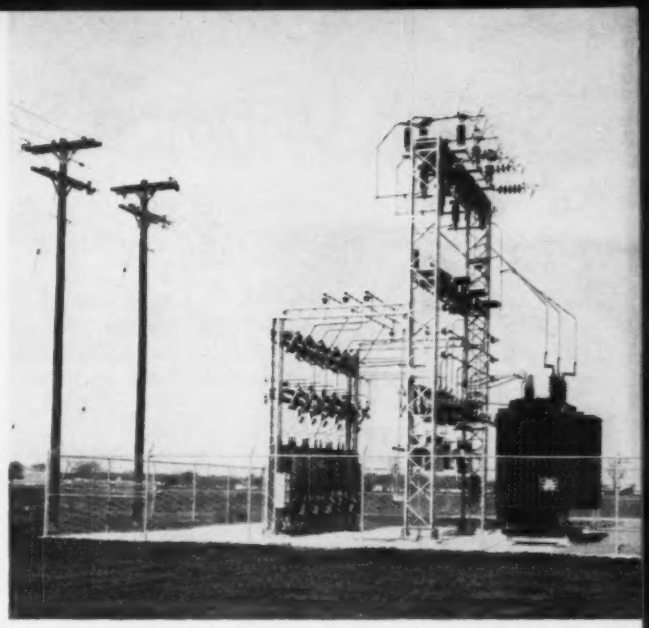


FIG 2—FOUR-COLUMN SUBSTATION design provides for 20-Mva capacity



NEWER SUBSTATIONS are built in accordance with the plan in Fig 2. In all, 12 have been built, and these are so arranged that further expansion is feasible

to Grow in Planned Steps

Transformer capacity, studies show, is most economical when standard sizes are used. The new design standardizes on 2,500, 5,000, and 10,000 kva 3-phase units.

The four-column structures were planned for these and other requirements of a residential distribution substation. To accommodate a larger conductor size and, consequently, greater line tensions, diagonal structural members were adopted for transferring economically the stresses due to the higher line tensions to the rear column footings. Although the four-column design calls for an additional ton of steel, it permits a reduction of 4 cu yd of concrete. Light-weight Erecticon members are used wherever practicable, and recent developments in aluminum alloy trusses indicate that in Erecticon form it may be competitive with steel.

Switch cubicles, regulators, and frame-mounted 3-phase reclosers were installed formerly on concrete foundations. When it became practicable to change from group to circuit regulation, the regulators and 3-phase reclosers were installed on beams supported by structural columns. Between channel members, the 3-phase reclosers were suspended. Elimination of the recloser framework cut costs about $250 per 3-phase unit.

Relocating or repairing frame-mounted reclosers requires one truck with a boom for loading the recloser onto a second truck. But the channel-mounted reclosers can be loaded into a pickup truck by a portable hoist alone. The diagonal brace for the higher line tensions is so placed that a pickup truck can clear it. The joist may be used also for untanking the unit for inspection. This brings considerable savings in time and labor.

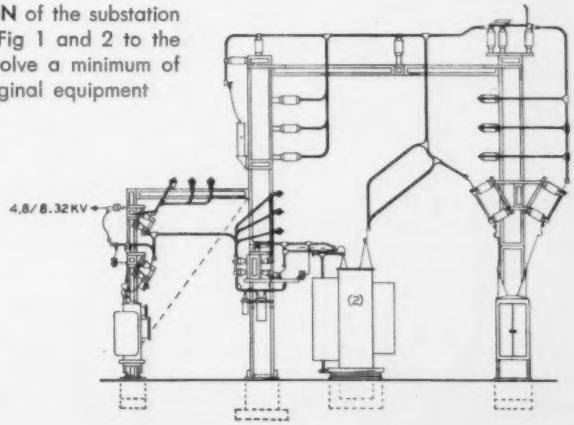
Regulators are on H-beams supported by the structural foundations and a small center foundation. In changing from group to circuit regulation, this center pad was the only concrete lost. Steel is quickly unbolted and equipment interchanged. Meters are on regulators as a unit. For ease of operation, regulator bypass switches and disconnecting switches are mounted as low as clearances permit.

Fuse location and mountings were considered for possible modification. Some fuses can be inverted. These have been relocated at a mounting under the air break switch. This permits reloading fuses easily and utilizes the same mounting steel needed for the air break switch.

Other fuses are mounted verti-

(*Continued on page 96*)

FIG 3—EXPANSION of the substation designs shown in Fig 1 and 2 to the ultimate would involve a minimum of changes in the original equipment



Switch Uprating Described to EEI

Installations were retained on 4-kv underground after change in pole bridging, T&D group told at Pittsburgh

A simple, quick method of increasing the momentary current rating of 4-kv underground oil switches was described to the Transmission & Distribution Committee of the Edison Electric Institute at its recent Pittsburgh, Pa., meeting.

By altering the bridging member between the switches' poles, Boston Edison Co put the mechanical pressure between the bridging member and the stationary contact pad, said W. H. Meade. Such conversion, he added, takes less than 2 man-hr.

Because of system expansion, local short-circuit currents were exceeding the manufacturers' momentary capability rating of the switches, he explained. These currents, he added, produced mechanical forces which opened the contacts, causing severe arcing. The change described, in effect, increased the momentary current capability from 10,000 to 25,000 amp.

Limiters Clear Faster

"Silver sand" limiters improved the clearance of faults on the Public Service Electric & Gas Co's 277/480-v spot networks, said T. E. Starrs. The limiters clear faster or at a lower point on the current curve, or both, than solid-element limiters they replaced.

Installed to clear faults on the secondary bus and service leads, the silver sand limiters clear extremely heavy short-circuit currents in a quarter cycle, without venting high-temperature gases.

Boston Edison's program for training "crew leaders" was des ibed by H. D. Shea. It consists of a series of five half-day conferences for groups of five or six men, sessions lasting 1½ hr. The program aims at developing a desire for better leadership; showing "crew leaders" how to direct men in the use of tools and equipment on hand, and ways to better job planning and work assignment.

Cable failures in 1958 were more numerous than in any year since 1948, save one, H. L. Davis, Philadelphia Electric Co, told the meeting. Failures, he said, reached a level of 8.35 per 100 cable miles for all voltage classes, and this trend continues. His report noted that mechanical damage and "unknown causes" were the principal reasons given for failures, cable movement causing 18% of all cable troubles and 44% of those attributed to mechanical damage.

There were no failures, he emphasized, on the 1,545 miles of pipe-type cable installed in the US, but solid-type cable had 91% of the failures. His report covered 16 companies, each having more than 200 miles of cable at voltages over 7.5 kv—an aggregate of 19,900 miles of cable, 411,000 joints, and 14,000 terminations.

Urges Lower Loss Ratios

Balloting favored the standardization of network transformers, J. A. Bulsford, Public Service E&G, announced. Of 64 companies voting, 35 were for the standard, he said. Among objectors were companies complaining about the absence of their voltage from Table N-1 of the standard.

K. W. Klein, Cleveland Electric Illuminating Co, asked for the adoption of a single loss ratio by the industry for distribution transformers. He reported his company's study which showed a possible saving of $20 per unit with lower loss ratios and an estimated $20,000,000 annual saving for the industry.

Klein's analysis was based on 25-kva, single-phase transformers with 4,800-v primaries operating at 80 pf. He compared three designs, one having a ratio of copper-to-core losses of 3.5 to 1 and costing $300, another having a ratio of 2 to 1 and costing $310, and a third with a ratio of 1.5 to 1 and a cost of $350. The latter two, he said, showed significant savings.

NEMA took a dim view of the effect of higher secondary voltages on appliance manufacturing and marketing, said T. C. Duncan, Consolidated Edison Co, in explaining the association's rejection of the joint EEI-NEMA report on higher secondary higher voltages.

Dave Burns, Detroit Edison Co, said that out of 600 research suggestions submitted to the Research Activities Task Force, some 70 were considered worth study. Burns, chairman of the task force, said that a $100,000 research program on conductor vibration and galloping at Massachusetts Institute of Technology was accepted.

Among others recommended were: Investigation of the use of epoxy resins in cable terminations; a study of synthetics in EHV cable, with particular attention to designing the molecule; and, an investigation into the mechanics of lightning flashover.

H. L. Murphey Jr, Duquesne Light Co, urged closer cooperation between utilities and urban redevelopment groups to achieve mutual education and the best compromise of objectives. As utilities, he said, are not likely to get protective legislation for the collection of relocation costs, they should develop ways of working with municipalities and planning agencies.

Upgraded Towers

Mechanization of line truck equipment since the 1950's has enabled Pacific Gas & Electric Co to reduce crews from six to four men and thus to obtain additional crews without increasing manpower, said C. R. Machen. Mechanized street lamp replacement, he said, has trebled and possibly quadrupled.

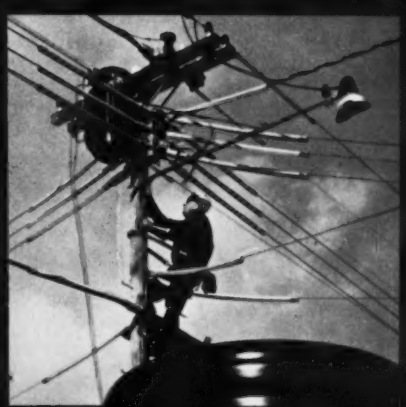
A program of upgrading Duquesne Light's 69-kv steel tower transmission facilities to 138 kv was described by R. D. West. It was initiated in 1956, with an addition of generation, when the company faced the necessity of building new lines on new right-of-way, or finding a means of upgrading its 69-kv.

Analysis of tower structures showed that most of them could stand increased mechanical loadings with only minor replacement of secondary members. Increased clearances between dead-end jumpers and tower steel was obtained with strut insulators. Upgrading, he said, costs less than half as much as a new line.

GENERAL ELECTRIC ANNOUNCES...

A NEW METHOD OF TRANSFORMER RATING

DEVELOPED SPECIFICALLY TO LET YOU TAKE FULL ADVANTAGE OF THE BENEFITS OF GENERAL ELECTRIC'S PERMALEX INSULATION



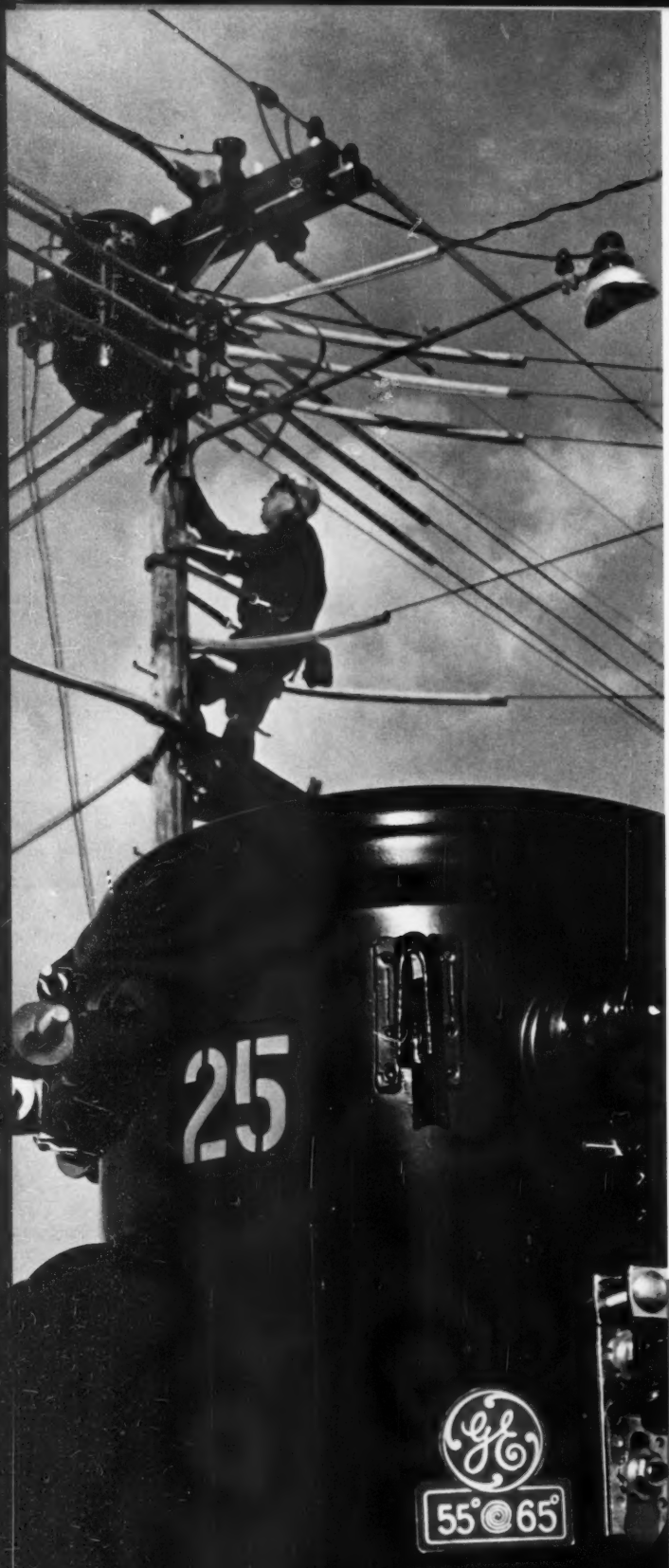
DISTRIBUTION TRANSFORMERS

NETWORK TRANSFORMERS

MEDIUM TRANSFORMERS

General Electric's new rating method gives you higher kva ratings, with full operating life, at no extra cost.

GENERAL ELECTRIC



Using General Electric's new transformer rating method, you utilize

Greater kva capacity with Permalex* insulation

Permalex insulation was developed in G-E laboratories, and reported to the industry in AIEE paper TP-60-58 over a year ago. But standard rating systems have not permitted some users to fully realize the benefits of this outstanding insulation system — until today.

Now General Electric announces a NEW method of rating transformers, specifically designed to let you take maximum advantage of the higher kva capacity possible with Permalex insulation.

An additional higher kva rating now appears on G-E oil-filled distribution and network transformers.

*Trademark of General Electric Company

GENERAL ELECTRIC'S PERMALEX insulation gives you more kva — at lower cost-per-kva. Photo at left shows new 55° ● 65° label which identifies G. E.'s new dual-kva distribution transformer.

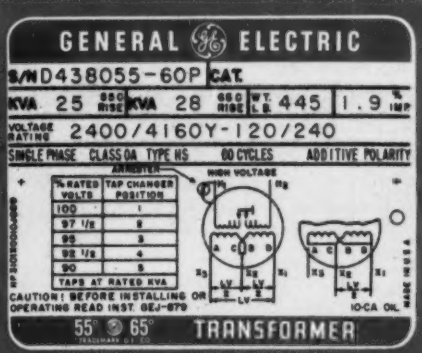
For example — a transformer formerly rated 25 kva is now rated 25/28 kva — indicating that you get the full benefits of a 28 kva unit from a General Electric transformer ASA-rated at 25 kva.

The nameplate is labeled **55° ● 65°** to show the corresponding average winding rises associated with these two kva ratings. Here are sample ratings: 50 kva is now 50/56; 250 kva is now 250/280; and 750 kva is now 750/840 kva. Permalex insulation enables you to base your transformer utilization on the higher load and temperature with no sacrifice in transformer life.

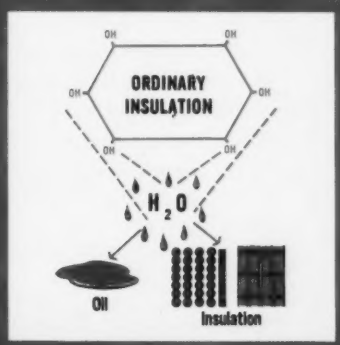
Using the new higher kva rating, you can now apply the full benefits of Permalex insulation *according to your established loading practices.* Since you get more kva capacity at no price premium, you can realize substantial savings on cost-per-kva.

Your General Electric Sales Engineer can give you a dollars-and-cents breakdown of the actual savings *you* can get. Contact him today, or write for bulletin GEA-7047 to Section 482-05, General Electric Company, Schenectady 5, New York.

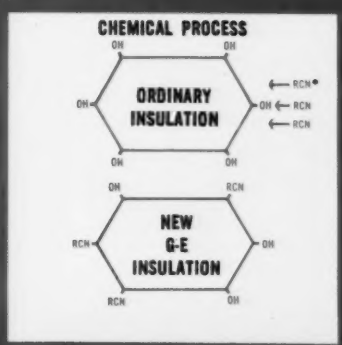
GENERAL ELECTRIC



NEW NAMEPLATE shows ASA standard 55C rise kva rating, plus General Electric's new kva rating based on 65C rise — made possible by Permalex insulation.



HERE'S WHY Permalex insulation allows transformer operation at 65C winding rise. Chemically modified insulation in G-E Permalex system drastically reduces formation of water which attacks turn and layer insulation in ordinary systems.



FULL-VALUE
CERTIFIED
TRANSFORMER
GENERAL ELECTRIC

- Superior design, features, and performance
- Faster shipment
- Complete service

HERE ARE THE NEW RATINGS

	55C Self-Cooled	65C Self-Cooled	65C Fan-Cooled
1φ	833 kva	933 kva	1073 kva
	1250 kva	1400 kva	1610 kva
	1667 kva	1867 kva	2147 kva
	2500 kva	2800 kva	3500 kva
	3333 kva	3733 kva	4666 kva
	5000 kva	5600 kva	7000 kva
3φ	750 kva	840 kva	966 kva
	1000 kva	1120 kva	1288 kva
	1500 kva	1680 kva	1932 kva
	2000 kva	2240 kva	2576 kva
	2500 kva	2800 kva	3500 kva
	3750 kva	4200 kva	5250 kva
	5000 kva	5600 kva	7000 kva
	7500 kva	8400 kva	10500 kva

Permalex insulation now used in G-E medium transformers

General Electric now extends the use of Permalex insulation to medium transformers to give you 12 percent higher kva with continuous operation at 65C rise. You get this bonus kva at no price premium — and with no loss in transformer life expectancy.

For example — a G-E medium transformer with Permalex insulation, formerly rated by ASA at 5000 kva, 55C rise, can now be operated at 65C rise and 5600 kva with normal life. If you operate the transformer at ASA rating you get five times longer life. In addition, standard fan-cooled rating increments can be applied at 65C rise operation.

Your General Electric Sales Engineer has specific information on the savings you can realize with the new higher kva ratings — another Certified Full-value feature of General Electric medium transformers. Give him a call, or write for detailed information to Section 482-05A, General Electric Company, Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Connect Aerial Cable to Outdoor Switchgear

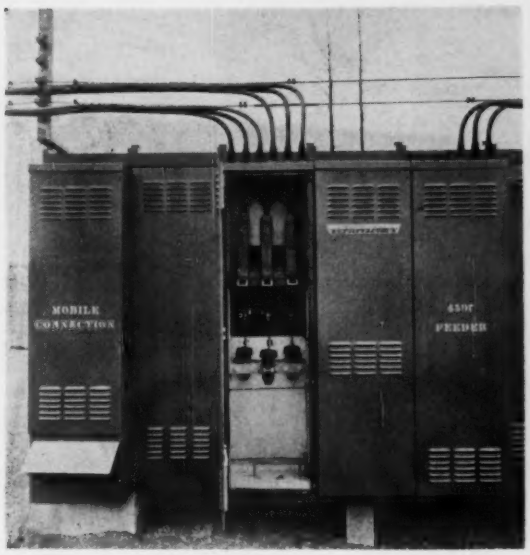
J. F. JONES, Senior Engineer, Baltimore Gas & Electric Co, Baltimore, Md.

Baltimore Gas & Electric Co now is connecting 4-kv aerial cables to outdoor metal-clad switchgear, thus making unnecessary or deferring expensive manholes and duct systems necessary for underground cables. Use of aerial cable feeders, in numbers up to 12 per substation, eliminates the need for the sizable structure or many holes that would be required for 12 open-wire overhead feeders.

The aerial cable consists of three 1/c 500-MCM cables, non-shielded, twisted and pre-assembled on a ½-in. Copperweld messenger, bound by copper strap. The cable is supported by the built-in messenger which may be anchored to the top of the switchgear and strained in any direction. Due to the number of feeders involved, however, messengers are strained between poles at each end of the switchgear. Two cables, approaching the switchgear in opposite directions, thus can be supported by portions of the same messenger.

Individual single-conductor cables enter the switchgear compartment roof through 1½-in. pipe nipples on 4-in. centers, three being about 11 in. nearer the rear door then the others. They are connected to the internal bus by clamp-type connectors. Insulating compound and friction tape seal the cable to the pipe nipples on top of the switchgear and the penciled end of the cable insulation.

Switchgear compartments are designed to accommodate two underground or two overhead feeders, or one of each per feeder position. One cable per phase per feeder is adequate under present feeder loading policy. However, for economic reasons, two lightly loaded feeders are supplied temporarily from one feeder position. Lightning arresters for overhead cables are installed on the pothead support bars in the switchgear. Copper bus extensions to which overhead cables are connected may be turned downward for underground cables.



In the ultimate development of these stations, 12 feeders per station are contemplated, or six on each side of a double row of center-aisle switchgear. Feeder cables leave by both front and rear of the station, although all could leave in the same direction.

Lubricant Protects Pedestal Gibs

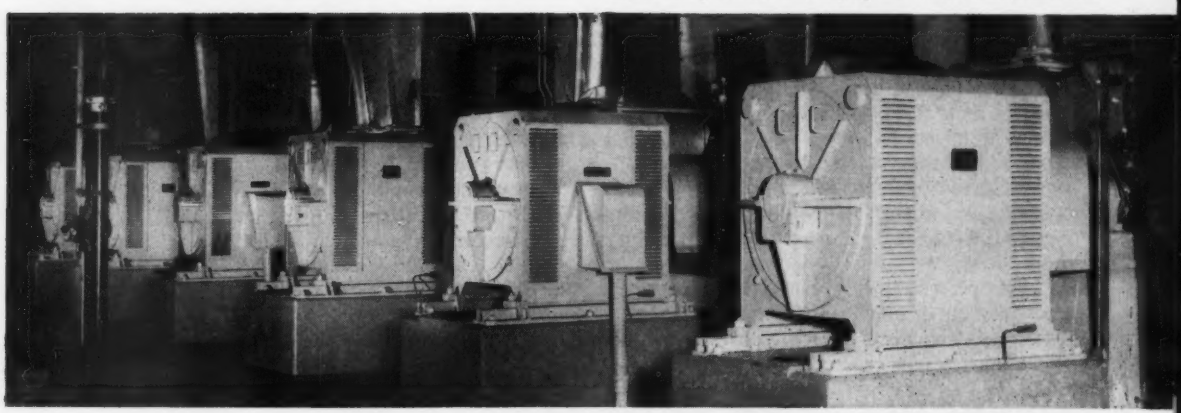
Maintenance personnel at Consolidated Edison Co of New York are protecting pedestal gibs in some of their turbogenerators by weekly applications of a grease-type solid lubricant especially designed for extreme pressure and temperature service. The lubricant, MOLYKOTE G, made by Alpha-Molykote Corp, contains a high percentage of purified molybdenum disulfide and other ingredients in a lithium soap base.

Although bearing pressures average about 150 psi and operating temperatures go up to 250F, the overall load on a pedestal gib is great. A typical gib has a machine bearing surface 3 in. wide and from 3 to 6 in. long. Four of them support the entire weight of a turbine, which may be as much as 65 tons. The MOLYKOTE G plates gib surfaces with solid lubricant and maintains this film regardless of the constant action that wipes away ordinary lubricants.

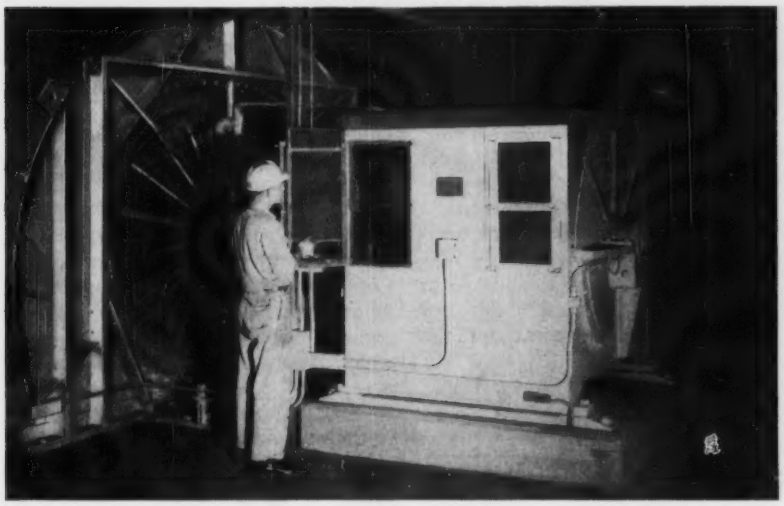
BIG

The three 5000-hp, 2-pole Elliott motors shown above are the first of this size ever installed. Each motor drives one boiler-feed pump and one heater-feed pump. Special "easy-access" features were developed in cooperation with Detroit Edison.

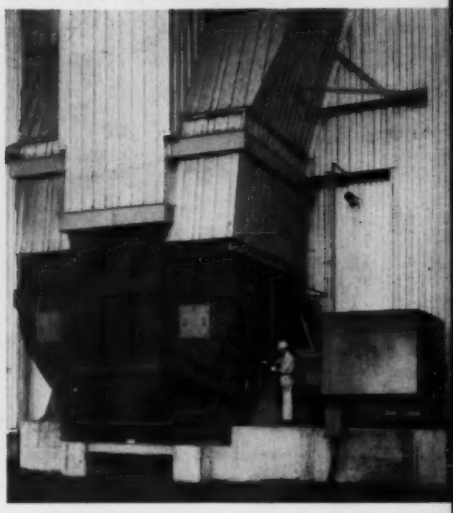
The six Elliott 600-hp, 900-rpm dripproof motors, below, are driving pulverizer mills. All auxiliary motors, 200 hp and above, are 4000-volt, Fabri-Seal insulated, designed for full voltage starting and include many features that simplify and reduce maintenance cost.



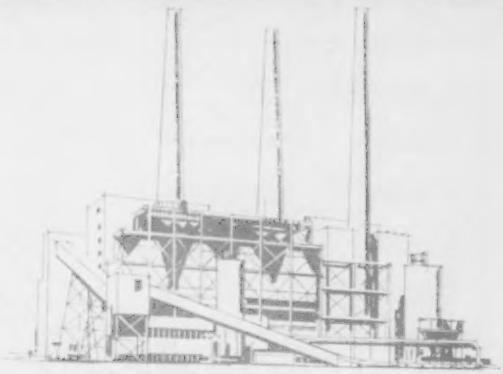
One of two 1500-hp, 900-rpm horizontal, squirrel-cage induction motors driving forced-draft fans. Operator is changing filter in hinged, swing-out "easy-access" filter panel.



One of the two Elliott 2500-hp, 600-rpm weather-protected horizontal, squirrel-cage induction motors, which drive induced-draft fans.



ELLIOTT MOTORS



TAILORED TO SERVE DETROIT EDISON

For River Rouge Unit No. 3 of Detroit Edison, all major auxiliary drive motors were furnished by Elliott. A list of these motors is shown at the right.

Included are three large motors that are unique in several respects:

They were the very first 5000-hp, 2-pole motors ever built.

They incorporate special "easy-access" features developed in close cooperation with Detroit Edison to meet specific and unusual requirements.

They attain new levels of super-quiet operation.

The "easy-access" requirement included the specification that two men using only ordinary hand tools could completely disassemble the motor for internal inspection without having to lift any part weighing more than 100 pounds. Working with Detroit Edison, Elliott engineers met these rigorous conditions with a design that permits fast and easy removal of bracket covers, inner baffles, filters and bearing sleeves, for internal inspection or cleaning.

Elliott motors serving the River Rouge Station are listed below. They add up to a total of 29,350 hp.

Number	*Application*	*Rating*	*Speed*
3	Boiler-feed and Heater-feed Pumps	5000 hp	3600 rpm
2	Induced-draft Fans	2500 hp	600 rpm
2	Forced-draft Fans	1500 hp	900 rpm
2	Circulating Water Pumps	600 hp	400 rpm
6	Coal Mills	600 hp	900 rpm
2	General Service Water Pumps	250 hp	1800 rpm
3	Heater Drain Pumps	200 hp	3600 rpm
3	Condensate Pumps	150 hp	900 rpm

Elliott motors also drive vent fans and flue dust fans.

ELLIOTT Company

Ridgway Plant • Ridgway, Pennsylvania

RO-2

Loading Guide Helps Eliminate

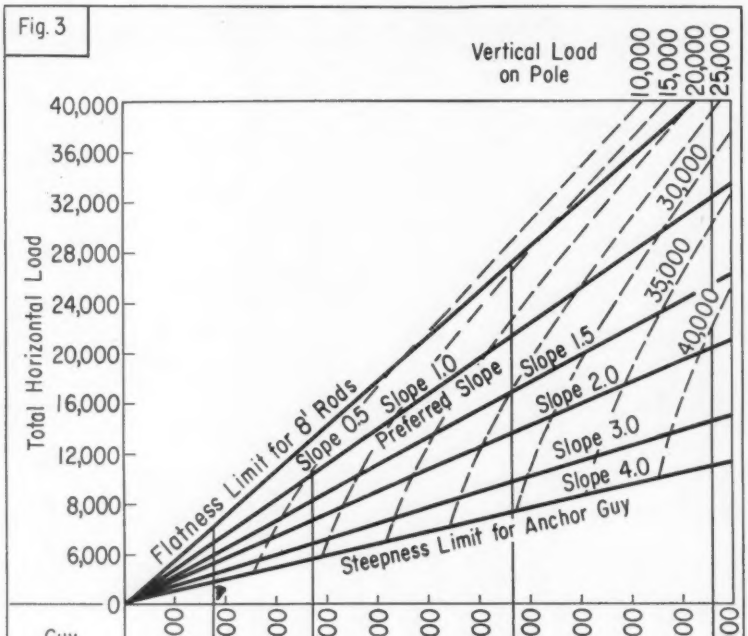
J. E. ROSS, Technical Engineer,
H. G. SADDOCK, Technical Engineer,
Rochester Gas and Electric Corp,
Rochester, N. Y.

A simple guide for pole setting can help guard against dead-end pole failure due to high stress column loads. This problem has been aggravated by the trend to increasing wire sizes and shorter anchor leads. For example, a 40-ft pole with an 11-ft anchor lead is subjected to about 30,000 lb of vertical load with only 10,000 lb of horizontal load applied.

Safety factors were established to insure the mechanical failure of conductors or messengers before the failure of the dead-end pole. It is felt that this is consistent with sound engineering and maintenance practices.

Timber Products Laboratory and US Department of Agriculture formulas were used to set up the guide. However, owing to joint ownership with telephone companies which apply loading at different points on the pole, it was necessary to analyze fiber stress at all points in the pole column, rather than just at the critical section.

Fig. 3



Guy Tension	4,000	8,000	12,000	16,000	20,000	24,000	28,000	32,000	36,000	40,000	44,000	48,000
Guy Spec.	For FX (D or DX)	A or AX		Two Guys				Three Guys				
Guy Size	5/16	7/16		(2) 7/16				(3) 7/16				
Bolt Size	5/8	3/4		3/4				3/4				
Rod Size	5/8-7'	1-8'		1-8'				1-8'				
Anchor Sand	16"Plate	20"Plate		(2) 20"Plates				(3) 20"Plates				
Anchor Clay	16"Plate	20"Plate		(2) 20"Plates				(2) 20"Plates				
Anchor Hardpan	16"Plate	20"Plate		(1) 20"Plates				(2) 20"Plates				

Directions: 1. Locate horizontal load on vertical scale.
2. Proceed horizontally to the line for slope of guy. Area in which point lies indicates proper size guying.
3. Follow vertically down, from the point for proper guy specification.
4. Follow dotted line up from the point to the top horizontal scale for the vertical load on pole.

Study in Three Parts

The problem was approached in three parts. The top one-third of the pole was considered a long column, the middle one-third as an intermediate column (statically indeterminate), and the bottom one-third as a short post. Referring to Fig 1: with a force applied at point "C" a maximum stress occurs at point "B." A similar stress diagram is created by starting the telephone messenger at a lower point.

By graphical analysis and combination of all pole classes, it was determined that each user may have up to 70% of the maximum allowable column load at his respective attachment point without exceeding the allowable fiber stress.

An investigation of the effect of heavy transformers, sometimes installed on dead-end poles, was also made. The allowable vertical load on a dead-end pole should be reduced by the total weight of the transformers installed. The fibers of the pole adjacent to the transformer mounting were studied to insure that no crushing or horizontal shear takes place at the bolt hole. The attachments were found to be adequate for all normal-size distribution transformers.

Test Scale Models

The theoretical approach was verified with breaking tests. The expense and hazards of destruction of 25 or 30 full-size poles to insure an adequate test dictated the use of scale model testing. Over 30 scale models equivalent to 40-ft Class 3

Dead-End Pole Failure

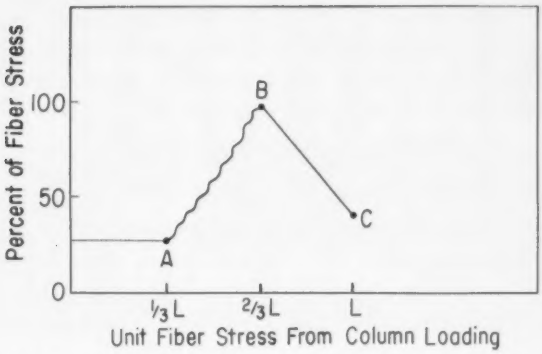


FIG 1—WOOD POLE is divided into three parts for study. When force is applied at C, maximum stress occurs at B

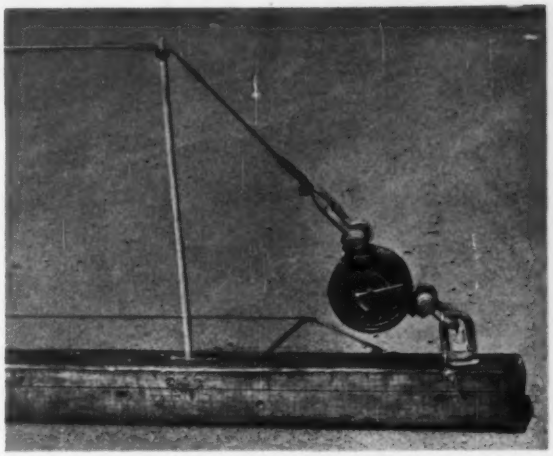


FIG 2—TEST SETUP was used to take over 30 scale models to destruction. Scale weight transformers were also used

pine poles were tested to destruction. This included numerous tests with scale weight transformers. The tests proved that the theoretical values were conservative even considering the clear and dry condition of the samples.

Example:

Assume three 4/0 all-aluminum bare wires and three 1/0 all-aluminum 6/64-in. polyethylene-covered wires dead-ended on a 45-ft pole with a guy lead of 36 ft and guy attached 36 ft above ground. Joint pole ownership.

H/L Slope = 36/36 = 1.0

3 × 3,590 = 10,770 lb

3 × 1,770 = 5,310 lb

16,080 lb = total horizontal load.

Locate total horizontal load on Fig 3 and follow directions at the bottom of the page. Fig 3 indicates that two anchors should be used, and that there is a vertical load of 16,000 lb on the pole. From the table a 45-ft Class 3 joint pole is required for a vertical load of 16,000 lb.

The tables below are used for guying problems. Table A lists the breaking strengths of the line conductors; these are added together to determine the horizontal load. Table B lists the allowable vertical load the pole will withstand. The vertical load from Fig 3 is compared with the allowable loads in Table B, and the proper class of pole can be selected.

A Line Conductor Tensions			B Maximum Vertical Pole Load			
Wire	Type	Breaking Strength (Lb)	Height (Ft)	Class	Company-owned	Joint
All-Alum.	1/0 4/64-poly	1,770	Pine—30	3	36,000 lb	25,200 lb
	4/0	3,590		5	21,200	14,800
	4/0 6/64-poly	3,410		6	15,300	10,700
	336.4	5,940	35	3	32,600	22,800
	336.4 6/64-poly	5,640		4	22,700	15,900
ACSR	4	2,288		5	16,800	11,700
	1/0	4,280	40	1	50,300	35,200
	1/0 6/64-poly	4,070		2	40,700	28,500
	3/0	6,675		3	27,700	19,400
	3/0 6/64-poly	6,340		4	19,500	13,700
Alumoweld	3/8	15,930		5	13,500	9,500
	7/16	19,060	45	1	36,200	25,400
Copper	6	960		2	29,700	20,800
	2	2,361		3	23,000	16,100
	2/0	4,640		4	16,600	11,600
	4/0	7,278		5	11,600	8,100
Copperweld	5/16	9,196	Cedar—45	1	23,500	16,500
	3/8	13,890		2	20,500	14,300
	7/16	16,890		3	17,300	12,100
Messenger (galv.)	5/16	9,196	50	1	20,500	14,300
	3/8	11,500		2	19,200	13,500
	7/16	18,000		3	15,500	10,800
Triplex	1/0	4,280	55	1	16,700	11,700
				2	16,000	11,200
				3	13,100	9,150

Guying and Anchoring Notes

1. Joint use of anchors cannot be made with telephone company with a F or FX guy specification, or where there are poor ground conditions, such as very loose sand or swampy land. If the guy tension lies in the F or FX area a D or DX guy specification must be used for joint use. The D or DX specification requires 5/16-in. guy, 5/8-in. bolt, 1-in./8-ft rod, and a 20-in. anchor plate.
2. When using several anchors, there should be an equal number of guys to each anchor.
3. X (as in guy spec. AX) indicates strain insulator to be omitted.
4. An 8 or 10-inch expanding anchor may be used in place of the 10 or 20-in. crossplate anchors, respectively.

Procurement & Products

INVENTORY ▶ **Inventory hold-down continues for broad segment of industry.** Two surveys released in recent weeks make that clear. The monthly business report of the National Association of Purchasing Agents discloses that 36% of the NAPA members have definite plans to further reduce their inventories. Purchasing Week foresees some step-up in buying during the next few months, but says most of the material and equipment will go into production—not inventory.

Purchasing agents gave these reasons for paring inventories: (1) Tighter inventory control, (2) Reliance on ample stocks of suppliers, (3) Tight money, (4) Price stability. Purchasing Week sums it up, "For the near term, inventories are destined to remain a neutral factor in determining the level of business activity."

PRICES ▶ **Electrical equipment and apparatus were among the very few items** on which soft prices prevailed during May, the NAPA report showed. Commented NAPA, "Over-all prices continue to be stable; but, there are more and more instances of competitive situations that result in discounts from so-called 'book prices.'"

General Electric announces single-tank, oil-filled circuit breakers, 15 through 46 kv, will be priced 7½% below comparably rated three-tank breakers.

G&W Electric Specialty Co issues new price lists for compound, cable boxes, oil fuse cutouts, and oil switches. The list supersedes the previous discount sheet and reflects user's net price.

PRODUCTS ▶ **Moloney Electric Co announces** new high-temperature insulating paper, "Duratherm," for distribution transformers. Basic transformer design has not been changed, nor will high-temperature oil be required. In addition to nominal 55C rating, new transformers will have 65C rating, or 112% higher in kva. However, the company says the full benefit of new insulation will be realized only when utility industry has recommended ratings, loss ratios, and operating practices.

HANDLING ▶ **Studies are underway to adapt fuel cells to material handling** equipment. Two storage battery manufacturers—Exide and Electric Storage Battery—are working in cooperation with numerous materials handling equipment makers toward a power source that would be competitive with gasoline or battery-driven motors.

COPPER ▶ **Copper executive lists three factors** that will have an effect on copper supply and price during the next year. These are (1) Political conditions in Africa. (2) Labor contracts with mines in Chile. (3) Levels of industrial activity in US and Europe.

LABOR ▶ **Electrical manufacturers will get a preview of** union demands as the IUE presents its position to General Electric in New York today.

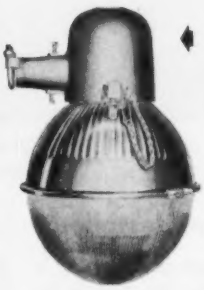
PEMCO LIGHTING

BACKED BY ALMOST 80 YEARS EXPERIENCE

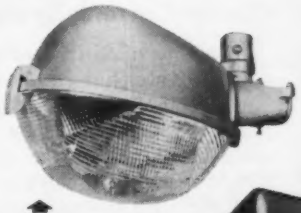
STREET & HIGHWAY LIGHTING

One-piece NEMA standard side entrance or top entrance aluminum head with transformer or choke coil—for 100, 175 or 250 watt mercury lamp. Illustrated is side entrance head with NEMA standard twist lock adapter and Fisher-Pierce 6600A Photo-Control. For use with Class "A" and "B" reflectors. Request information on conversion kit for existing NEMA standard incandescent heads.

One-piece NEMA standard aluminum head with NEMA standard twist lock adapter for Photo-control. Also available with 1¼" plug. Junior style heads with NEMA standard twist lock adapter are also included in the Pemco line.

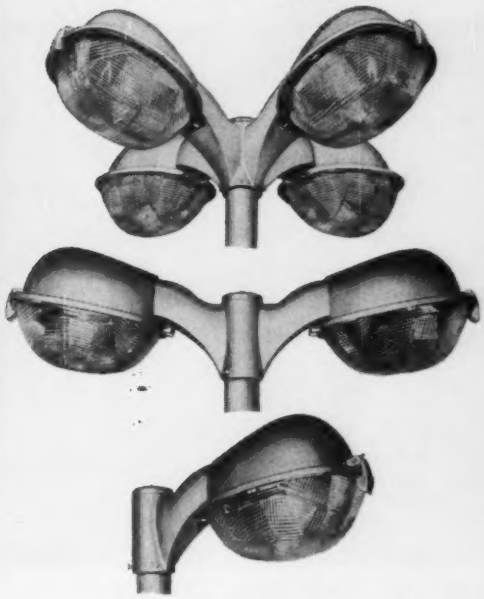


Style 80 Standard Enclosed Luminaire for series or multiple circuits. IES Types I, II, III, IV and V. Hinged or wedge band. Fluted alzak reflector. Also available with Style 20 Top Entrance Head. For incandescent or mercury lamps, with or without adapter for Photo-control (see above). There is a variety of Pemco Open Reflectors to fit both Standard and Junior Heads.



Three styles of Pemco Mercury Luminaires, with or without NEMA Standard twist lock adapter:
Style 67 for 250 watt Mercury Lamp—IES Types II and III.
Style 68 for 400 watt Mercury Lamp—IES Types II, III and IV.
Style 69 (with built-in ballast) for 400 watt Mercury Lamp—IES Types II, III and IV.

AREA LIGHTING



Pemco 4-Lite All aluminum Mercury Area Luminaire for high level illumination using four 400 watt mercury lamps, and matching 1-Lite and 2-Lite Luminaires. Highly efficient—unusually attractive.
Other Pemco Area Luminaires include 36", 48", 60" and 72" dia. aluminum reflectors with ball globe for one 500 to 1500 watt incandescent or 400 to 1000 watt mercury lamp . . . Fluorescent Area Luminaires . . . Walkway and Shrubbery Luminaires . . . Incandescent and Mercury Floodlights.

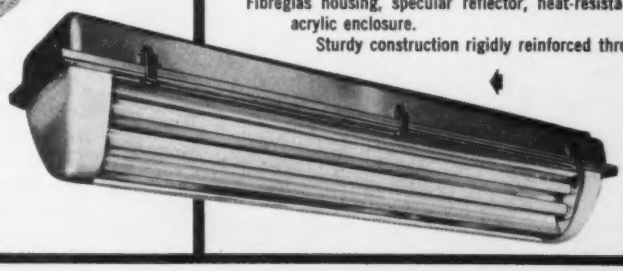
When requesting literature and catalogs be sure to specify on what type outdoor lighting.

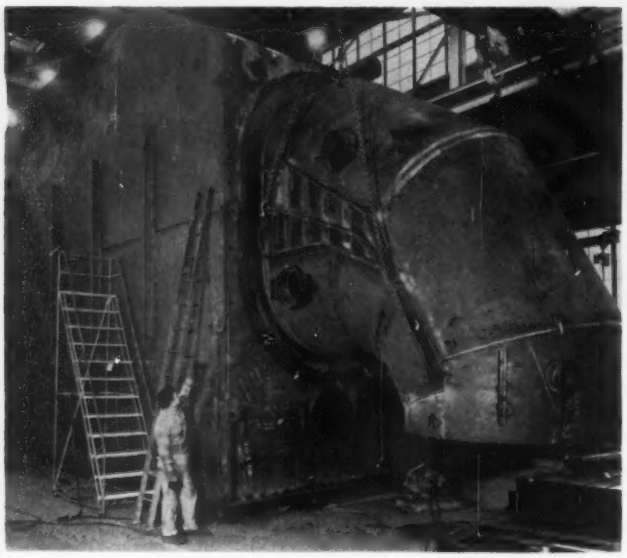
PEMCO LIGHTING HAS BEEN QUALITY LIGHTING SINCE 1882

PHILADELPHIA ELECTRICAL & MANUFACTURING COMPANY

1200-36 N. 31st St. P.O. Box 8359
Philadelphia 21, Pa.

Pemco Metropolitan Fluorescent Luminaires—
Style 48 for 2 or 4—48" 800MA or 1500MA lamps.
Style 72 for 2 or 4—72" 800MA or 1500MA lamps.
Fibreglas housing, specular reflector, heat-resistant clear acrylic enclosure.
Sturdy construction rigidly reinforced throughout.





A-S Cuts Condenser Erection Time

Modular construction is expected to reduce by one third erection time of the 110,000-sq-ft surface condenser (left). Contrary to usual procedure, the unit was completely fabricated and aligned into shell components at American-Standard Industrial Div's Buffalo plant. Usually, condensers of this size and type are erected completely at the power station from individual parts.

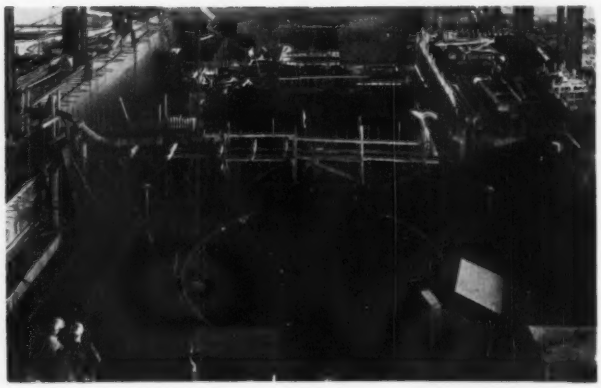
Major modular units include four water boxes, steam inlet plenum, and the shell chamber divided into four sections.

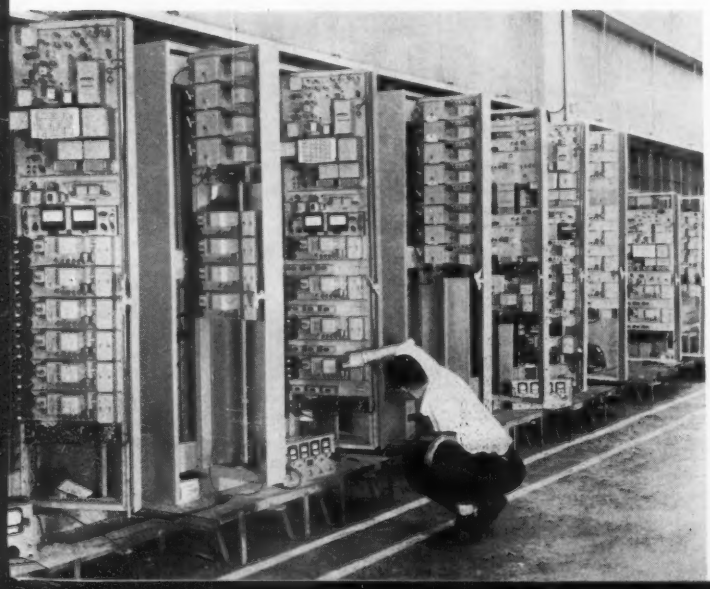
The unit, which will condense 1,410,000 lb/hr of steam with a back pressure of 2.65 in. Hg absolute, is being installed at Louisiana Power & Light Co's Little Gypsy station.

Hallam Nuclear Plant Takes Shape

Nuclear reactor vessel will be placed into the cavity liner shown in the center foreground of photo (right) taken at the Hallam nuclear power facility in Nebraska. Atomics International is building the 75,000-kw sodium graphite reactor.

At either side of the cavity liner are tunnels for primary sodium heat transfer piping. Fuel and reactor components storage cells are located in the center and background. Consumers Public Power District of Nebraska will operate the completed plant, which is scheduled for start-up and operation in 1962.





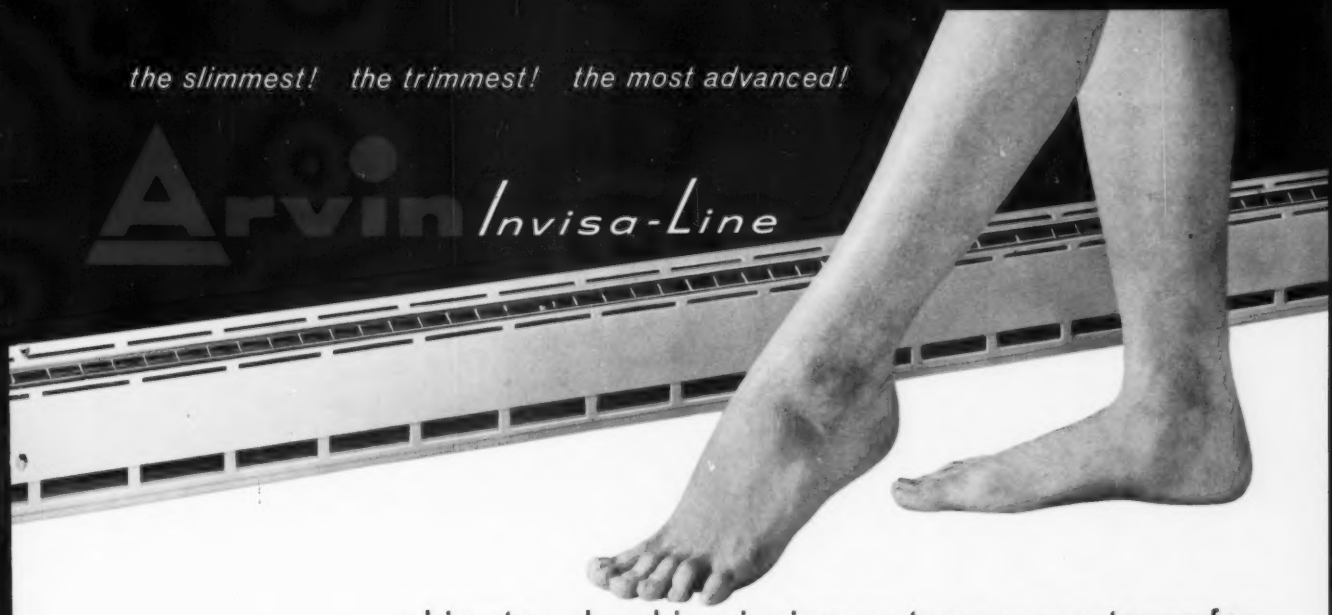
Carrier-Current System Installed

The City of San Francisco is installing a 30-channel power-line carrier-current system for the new Hetch Hetchy project at Cherry Dam in the Sierra Nevada. Built by the General Electric communication products department, the $100,000 system will provide all the necessary channels for telemetering, load control, transfer-trip relaying, directional comparison relaying, supervisory control of switches and circuit breakers, and voice communication for the system's five stations. It is shown undergoing test in photo (left). Each channel operates independently of the others, some only 500 cycles apart. This leaves frequency space available for future growth.

(*More News of Manufacturers on page* 73)

the slimmest! the trimmest! the most advanced!

Arvin Invisa-Line



a big step ahead in winning customer acceptance for

ELECTRIC BASEBOARD HEAT

only 4½" low, only 1¾" thin

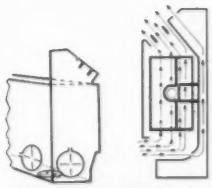
Arvin is ahead in the eye appeal that means buy-appeal

Arvin Invisa-Line is the slimmest, trimmest, most advanced of all baseboard heating units. A scant 4½″ low, a slim 1¾″ thin! Arvin Invisa-Line is safer, too, using only 140 watts per foot! To save installation time, all units are pre-wired for connecting at either end, and knockouts are provided at both ends, bottom and back. Attractive, compact thermostat baseboard sections, 120-volt duplex outlet sections, 240-volt single outlet sections and inside corners are available for low wattage series. Arvin also offers Invisa-Line in a high wattage series only slightly larger in size.

Arvin is ahead in design and construction

Arvin heavy duty fins are an integral part of the thick metal section welded to entire length of heating element and mounted on floating holders to eliminate expansion and contraction noises. Heating element temperatures are held to one-third rated capacity for long life. Element is guaranteed for a full five years, but can be expected to last indefinitely!

Arvin is ahead in acceptance in electric heat field



Three Knockouts at Both Ends Simplify Wiring

Arvin is a recognized leader in electric heating, with 27 years of experience to back them. The name Arvin is synonymous with electric heat, and equally famous for an entire family of quality consumer products that have been welcomed into millions of homes. First to introduce safety heat-limit thermostats in each electric baseboard unit, Arvin also is first to provide a secondary air passage at rear of unit that keeps back cooler. New chrome baffle attached to front of fin section reflects heat and keeps front surface temperature low. All these are better Arvin features that win wholehearted customer acceptance.

...and NOW,

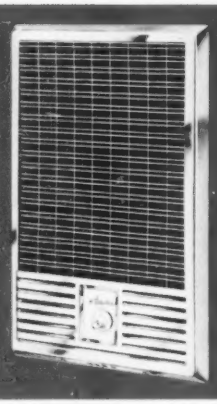
Arvin leads the way in PRE-SELLING for you!

Across America, in leading magazines and local newspapers, powerful and colorful advertising is bringing the Arvin story of performance and quality to millions. Arvin Electric Heat is promoted as a member of the Arvin family of finer products in customer-convincing ads that mean more and easier sales for you!

Arvin

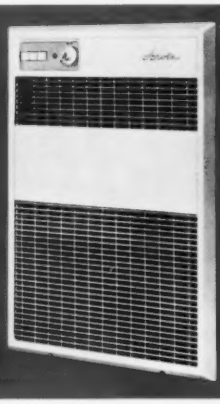
Arvin *built-in wall heaters...*

Meeting the modern trend to built-ins, Arvin has a full line of electric wall heaters in radiant, fan-forced and air circulator models. Designated as the 100, 200, 300 and 400 series, they are available in a wide range of sizes from 3413 to 13,652 BTU outputs. All models feature modern styling and fast easy installation. Since no framing-in is necessary, installation time in new or existing buildings is cut drastically.



Arvin 100 Series built-in radiant bathroom heaters feature modern design plus ribbon type heating elements that provide instant heat. Available in 1000 and 1500 watt—120 volt ratings.

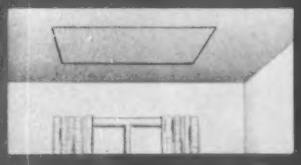
America's most beautiful built-in fan-forced bathroom heaters, the Arvin 200 Series feature finest Nichrome elements, dependable thermostats and whisper quiet fans. 1500 watt, 120 or 240 volt rating.



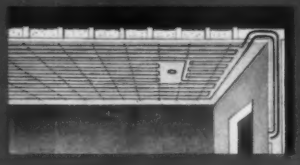
Arvin 300 Series heavy-duty fan-forced electric wall heaters feature push button control of "Off," "Heat," and "Cool." Heavy duty bulb-type thermostat, 1500, 2000, 3000 and 4000 watt—120 and 240 ratings. Can be painted to match walls.

The Arvin 400 Series are all-purpose radiant heaters for any room in the home, office or factory. No moving parts—absolutely silent. Three models, 1500, 2000 and 3000 watt—240 volt ratings. Also 1500 watt model in 120-volt size.

Arvin *Invisa panels, radiant heating cables, thermostats...*



Arvin Invisa panels are a favorite with architects, builders and home owners alike. They can be installed in any ceiling. The heating element is Arvin's exclusive printed circuit.



Arvin radiant heating cables have many advantages. No braid or loom is required and cold leads have heavy, UF-type insulation. Can be installed in plaster, drywall or cement.

Arvin wall thermostats are available in single and double pole models. Fast reaction, dependable operation. Sensing element reacts to both room air temperature and radiant heat. Flush mounting; wires from front.

Arvin *portable electric heaters...*

For more than a quarter of a century, the standard by which all other portable electric heaters are judged! Arvin offers a complete line in 110 volt and 220 volt heavy duty models. Arvin's Instant Ribbon Heat models are the fastest-heating electric heaters ever! The Arvin line includes radiant, fan-forced, automatic thermostat controlled models as well as non automatic switch controlled types.

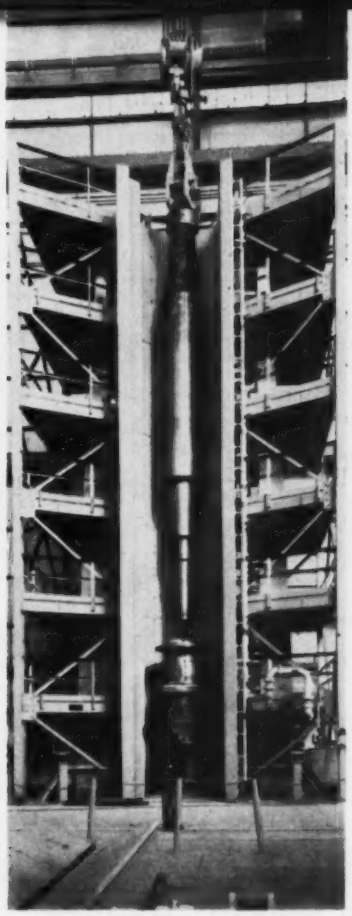
Push buttons control this handsome 220 volt Arvin portable heater, allowing instant selection of 3000 watts for 10,230 BTU output or 4800 watts for 16,368 BTU output with instant heat response.

Write Today **... for the complete Arvin story of electric heating. There is no obligation.**

Arvin

ELECTRIC HEAT DIVISION

ARVIN INDUSTRIES, INC., *Columbus, Indiana*

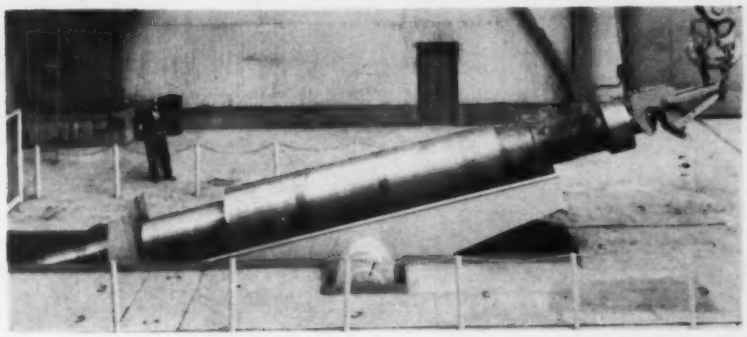


40-Ft Rotors Vertically Heat-Treated

Installation of seven new vertical furnaces for heat-treating generator rotors has been completed at the forging division of United States Steel's Homestead works.

The new facilities, consisting of a quench tower (left) and an upending cradle (below) in addition to the furnaces, were built primarily to satisfy customer demand for rotors heat-treated in an upright position. This, the company says, eliminates any residual stresses which may occur in horizontal-furnace heat treating. Rotor forgings 40 ft in length and 5 ft in diameter can now be accommodated, compared to previous 30-ft length limit.

Purpose of the upending cradle is to prevent the forging from bending while it is being raised from a horizontal to a vertical position. An overhead crane then lifts the forging from the upender and carries it to a waiting furnace. The 75-ft quenching tower has double doors to admit the forging. Once inside, the piece fits onto a rotating table which spins it in air or water jets until cooled to the right temperature.

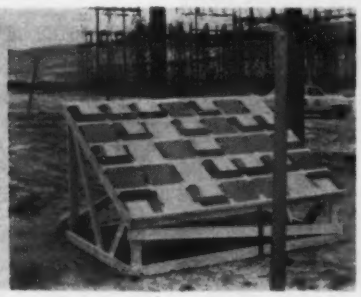


FPE Climate-Tests Various Finishes

Federal Pacific Electric Co has set up a test program to determine what type of finish it should use on a new line of outdoor transformers. To accomplish this under all types of weather conditions, test racks holding 70 squares of aluminum with seven types of finishes have been set up in six different parts of the country.

These areas are: Fairbanks, Alaska (below left), for cold and snow; Mohave Desert, Calif. (below right), for sandstorms; Corpus Christi, Texas, for chemical contamination, salt spray and heat; St. Petersburg, Fla., for high humidity and heat; Moss Landing, Calif., for seashore conditions of smog and humidity; and Newark, N. J., for industrial contamination.

By bringing a sample from each set back to Newark every six months, the company says it hopes to learn the best way of preparing a surface and applying the best finish.



MANUFACTURERS BRIEFS

Burndy Corp, Norwalk, Conn., has contracted to acquire the assets of **Husky Products,** Inc, Cincinnati, Ohio, manufacturer of aluminum and steel power and control cable supporting trays.

H. K. Porter Co, Inc, is acquiring the assets of **Allied Paint Mfg Co,** Tulsa, Okla., manufacturer of residential and industrial maintenance paints.

Westinghouse Electric Co "officially opens" its new multi-million-dollar circuit breaker plant in Trafford, Pa. About 900 employees are already at work there. The power circuit breaker department was formerly in East Pittsburgh.

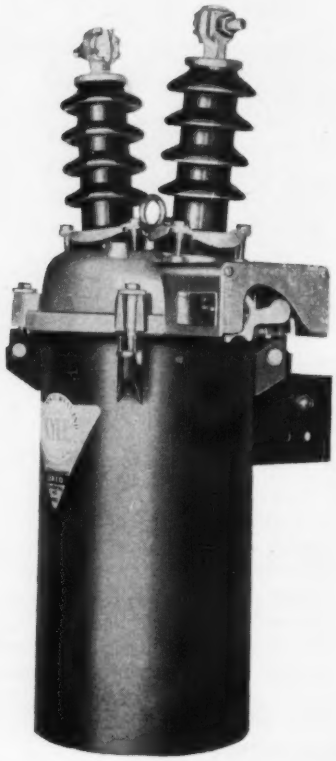
General Electric Co announces plans for the addition of a $2,000,000 capacitor foil rolling mill plant to its capacitor manufacturing facilities in Ft. Edward, N. Y. The company also has broken ground in Schenectady for its materials and processes laboratory.

(*More Procurement & Products, p* 74)

(For further information refer to Readers Service on page 78)

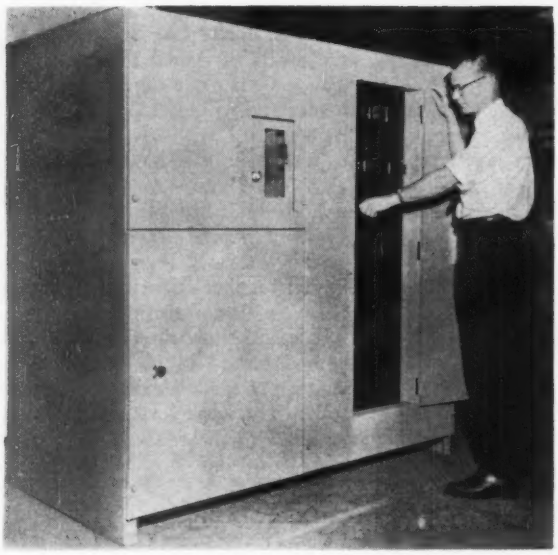
Open Cutout . . .

. . . for 200-amp service vents arc-expulsion gases downward in a small cone so that conducting gases and solid bits are not blown into the overhead structure. Small bore of the fuse tube maximizes pressure for rapid clearing of faults, even with low fault conditions. Interrupting capacities are 12,000 amp at 7.8 kv and 10,000 amp at 15 kv. A fuse ejector prevents restrike.
Hubbard and Co, 200 S Michigan Ave, Chicago 4, Ill.



Oil Switch . . .

. . . rated at 400 amp withstands 13,800 amp, asymmetrical, momentary current. The type J single-phase switch, which is manually operated, is available for system potentials from 2.4 to 14.4 kv. It is designed for sectionalizing, tie-line switching and interrupting load currents on distribution lines or in substations.
Line Material Industries, Milwaukee 1, Wis.



Packaged Substations . . .

. . . require as little as 60% of the floor area taken up by earlier models. Each Transfo-Unit combines a dry-type transformer and high and low-voltage control and protection equipment in a single assembly. Several switching schemes for high and low-voltage sides are offered. New ratings are 75-500 kva, 480-4,800 v primary, 120-480 v secondary.
I-T-E Circuit Breaker Co, 1900 Hamilton St, Philadelphia, Pa.

(*More New Equipment on page* 76)

KNOW-HOW

Victor 900 Suspension Insulators (EEI-NEMA, TDJ52-3) are universally used by utility men because they're rugged and built to last.

Looking at a VICTOR Suspension insulator, you'd think it was an easy item to manufacture. It isn't. You don't just stamp them out like cookies, bake them in an oven and presto—insulators. No, a lot of research, engineering and manufacturing know-how over a long period of years is required to produce insulators that have uniform performance characteristics and far exceed EEI-NEMA standards.

VICTOR has an enviable reputation for knowing how to make insulators that are superior in performance under the most gruelling conditions of service. Many a power man has decided to play safe . . . and choose VICTOR. For catalog, specifications and prices, contact your nearby Victor sales office. Victor Insulators Division, I-T-E Circuit Breaker Company, Victor, N. Y.

I-T-E CIRCUIT BREAKER COMPANY

Crapo STEEL STRAND

WEIGHT OF COATING TEST

...added assurance of dependability

The life of galvanized steel strand depends primarily upon the weight and quality of the zinc coating. The heavier the coating the longer the strand will last.

The wire used in CRAPO Galvanized Steel Strand is regularly subjected to the hydrochloric acid antimony chloride, or weight of coating, test. By means of this test the amount of zinc on the surface of the wire can be accurately measured.

This is but one of the many laboratory tests to assure consistently high, dependable quality in the finished product.

AVAILABLE IN 3 COATING WEIGHTS

CRAPO Steel Strand is regularly furnished in all standard sizes and grades and in Class A, B and C coatings. Class B coating is twice as heavy as Class A coating; Class C coating is three times as heavy.

Write for this FREE BOOKLET!

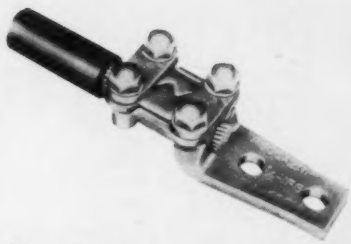
"The Story Behind CRAPO Galvanized Wire and Strand" describes and illustrates manufacturing and testing techniques. Ask for Booklet B-59!

INDIANA STEEL & WIRE CO., INC.
Muncie, Indiana

Transformer Test Unit . . .

. . . of 40 kva capacity checks 6.6 and 20-amp street lighting transformers' ability to maintain constant current output at 25%, 50%, 75% and 100% loads. Output voltages are 2,400 and 7,600 v. The 1,000-lb unit is on roller casters.

Multi-Amp Electronic Corp, Box 217, Union, N. J.



Connectors . . .

. . . for heavy-duty and bus connections are available for copper and aluminum. Both the P series shown and the JJ series include connectors for straight and 90-deg, terminal and reducer, single and multiple-conductor connections. Tongues with standard NEMA spacing or studs for secondary connections are provided in both series.

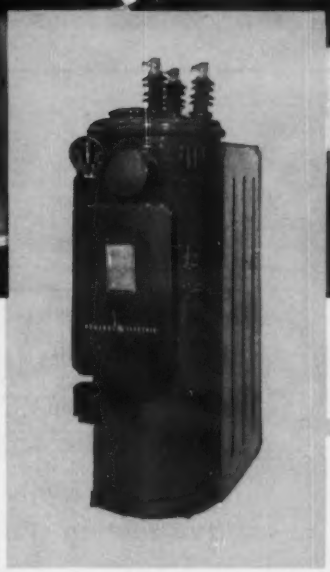
Fargo Mfg Co, 845 Main St, Poughkeepsie, N. Y.

Computer . . .

. . . for general use handles 100,000-200,000 instructions per sec. Cycle time for memory access is 5 μsec. Input and output equipment include a separate input-output typewriter,

(*Continued on page* 80)

ANOTHER STEP AHEAD IN VOLTAGE REGULATION



NEW Permalex Insulation

Permalex* coil insulation in General Electric voltage regulators boosts reliability—lengthens regulator life

New Permalex insulation—another regulator first from General Electric—is now standard on all G-E ML-32 single-phase, step voltage regulators. Permalex makes possible added regulator economies through longer core and coil life and greater reliability—at no price premium.

Permalex insulation preserves high dielectric strength because of the special cyanoethylation of its kraft insulation paper. This process, exclusive with General Electric, retards formation of moisture released by cellulose materials under load—slows aging process of insulation to give you longer regulator life. Permalex insulation is fully compatible with other regulator components and provides a true *system* approach to regulator design.

Another outstanding G-E regulator feature which increases quality, Permalex insulation gives you more regulator for your money. It is, in fact, another reason why *G-E regulators cost less on the line.*

Ask your General Electric regulator representative for more information about Permalex-insulated ML-32 regulators—as well as the entire line of G-E voltage regulators. Or, write to Section 456-03, General Electric Company, Schenectady 5, N. Y.

*Trade-mark of General Electric Company

Progress Is Our Most Important Product

GENERAL ELECTRIC

Readers Service

For additional information on new products, supplies, and services in this issue, the Manufacturers Editor of Electrical World offers his facilities. Check items in which you are interested in list below:

NEW EQUIPMENT

Hubbard.....Open Cutout ☐
Line Materials.....Oil Switch ☐
I-T-E .....Substations ☐
Multi-Amp.....Transformer Tester ☐
Fargo .....Connectors ☐
Digital Equipment.....Computer ☐
GE .....Motor ☐
International Harvester.....Truck Bodies ☐

OTHER

Manufacturers Editor
Electrical World
330 W. 42nd St.
New York 36, N.Y.

* Note: Requests must be received within four weeks of publication date, accompanied by complete information specified. This service cannot be offered to readers in foreign countries or to competitive manufacturers.

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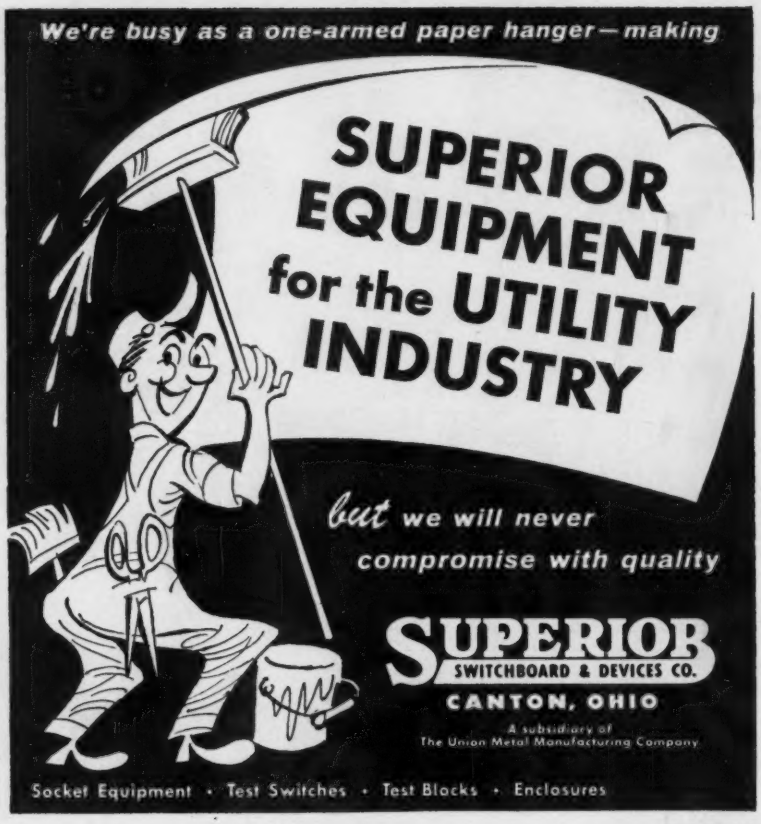
TITLE_____
DEPT._____
COMPANY_____
ADDRESS_____

FOR:
Reference ..... ☐
Specs ..... ☐
Trial ..... ☐
Purchase ..... ☐

JUNE 13, 1960


We're busy as a one-armed paper hanger—making
SUPERIOR EQUIPMENT for the UTILITY INDUSTRY
but we will never compromise with quality
SUPERIOR
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CANTON, OHIO
A subsidiary of The Union Metal Manufacturing Company
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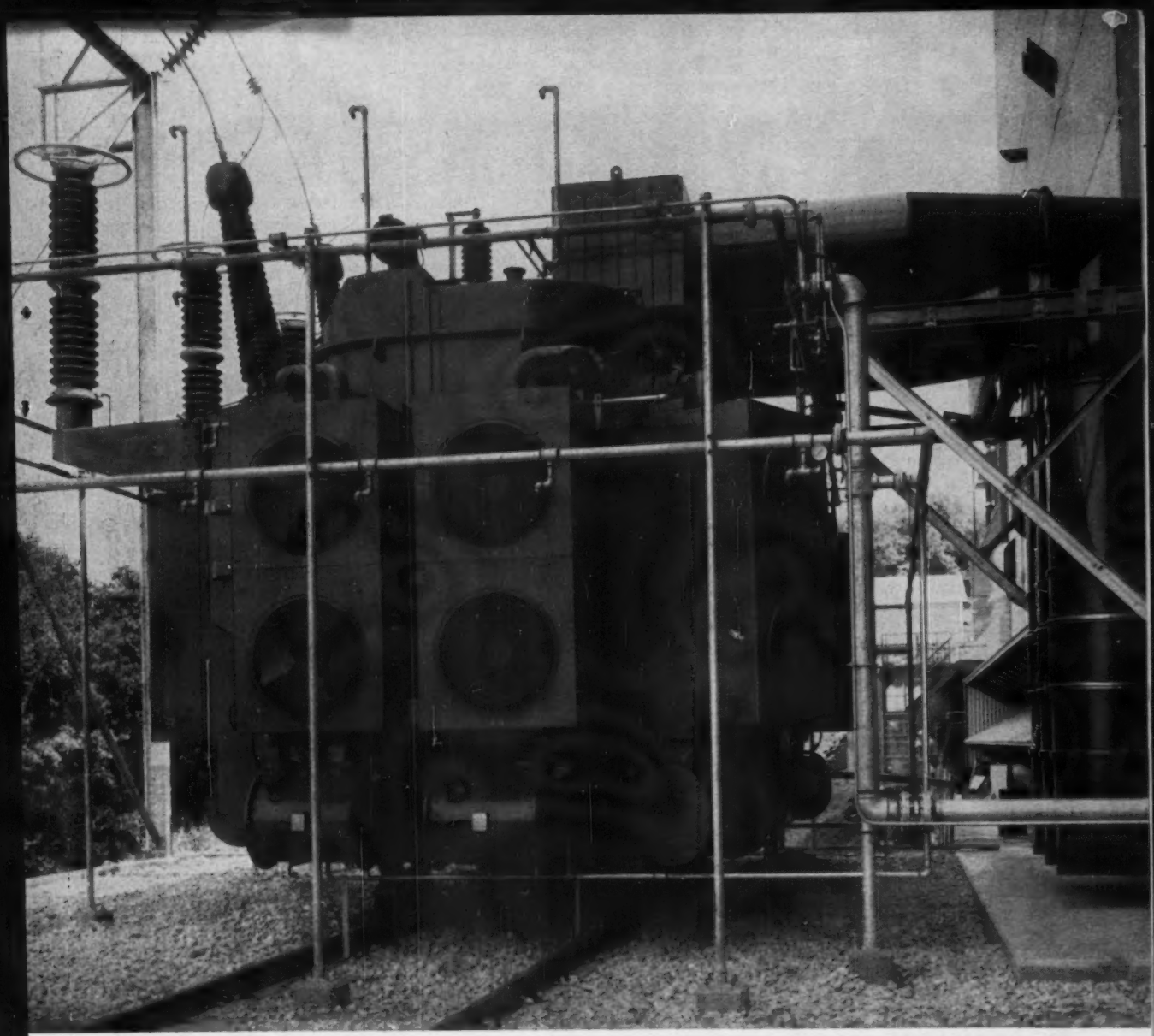


217,000 KVA, CLASS FOA, 230 KV

Another example of Moloney's ability to provide power transformers for every application is this 217,000 KVA, 230 KV Generating Station Transformer, built by Moloney. Now installed and in operation in a large eastern utility system. Specify Moloney... and get the *right* transformer to fit *your particular* needs.

217,000 KVA, 230 KV, 3 phase, Type FOA
HV 234,000
Grd. Y/135,000 volts
LV 13,500 volts delta
2—2½% no-load taps above and below normal

Since 1896... MORE POWER TO YOU

MOLONEY ELECTRIC CO., ST. LOUIS 20, MO., TORONTO, CANADA

MEEC-13

The simplified switch driving mechanism of the Delta-Star "MK-40" Switch has only three moving parts. Links, levers, and braids, which are sources of trouble both in operation and maintenance, have been eliminated.

Trouble-free operation in the worst weather is assured by the "MK-40's" powerful leverage. The blade is twisted about its axis in the first 15° of rotation, relieving contact pressure. The 45° adapter gives a high mechanical advantage when it is most needed—23° of insulator rotation provides the first 10° of blade lift. Blade is under positive control during both opening and closing cycles, and locks in both open and closed positions. Factory sealed bearings require no lubrication—simplifying maintenance.

"MK-40" Switches are available in capacities from 400 to 4000 amperes—7.5 to 400 KV. For complete information, write to *Delta-Star Electric Division, H. K. Porter Company, Inc., 2437 Fulton St., Chicago 12, Ill.*

DELTA-STAR PORTER **ELECTRIC DIVISION**

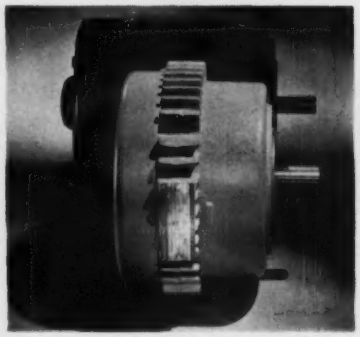
H. K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

Computer . . .

(*Continued from page* 76)

punch units and photoelectric tape reader. Magnetic tape and analog equipment are optional extras. The PDP-1 multiplies in 350 μsec, divides in 600 μsec.
Digital Equipment Corp, Maynard, Mass.



Motor . . .

. . . saves weight and space. The dripproof, totally enclosed Thinline, with NEMA type "C" face mounting, is designed to drive pumps, gears, hoists and propeller fans. The line is available in ratings from ½ to 5 hp at speeds to 1,800 rpm.
General Electric Co, Schenectady 5, N. Y.

Light-Truck Bodies . . .

. . . in 79 to 100-in. lengths are furnished in four conventional and three completely enclosed models. They have heavy-duty corrugated steel floors, full-length drip mouldings, completely enclosed wheel housings and welded double-panel steel compartment doors.
International Harvester Co, 180 N Michigan Ave, Chicago 1, Ill.

Naugatuck PARACRIL OZO

THE OIL-RESISTANT, OZONE-RESISTANT NITRILE RUBBER

Great new advance in hose rubber

New PARACRIL OZO—exciting development from the laboratories of Naugatuck Chemical—offers the makers and users of rubber hose a combination of properties never before available.

Hose of every description, for practically every purpose, can be tougher, less bothered by abrasion, more oil and weather resistant than ever before. *And it can be produced in any permanent color desired!*

New PARACRIL OZO offers such advantages as:

- significantly superior ozone resistance
- excellent fuel and oil resistance
- several times greater abrasion resistance
- permanent retention of bright, uniform colors

Discover first hand the dramatic new sales possibilities this proven new rubber offers you. In increased product quality. In new production economy. For full information and whatever technical assistance you may require, contact your Naugatuck representative or write the address below today.

Naugatuck Chemical

Division of United States Rubber Company Dept. A Elm Street Naugatuck, Connecticut

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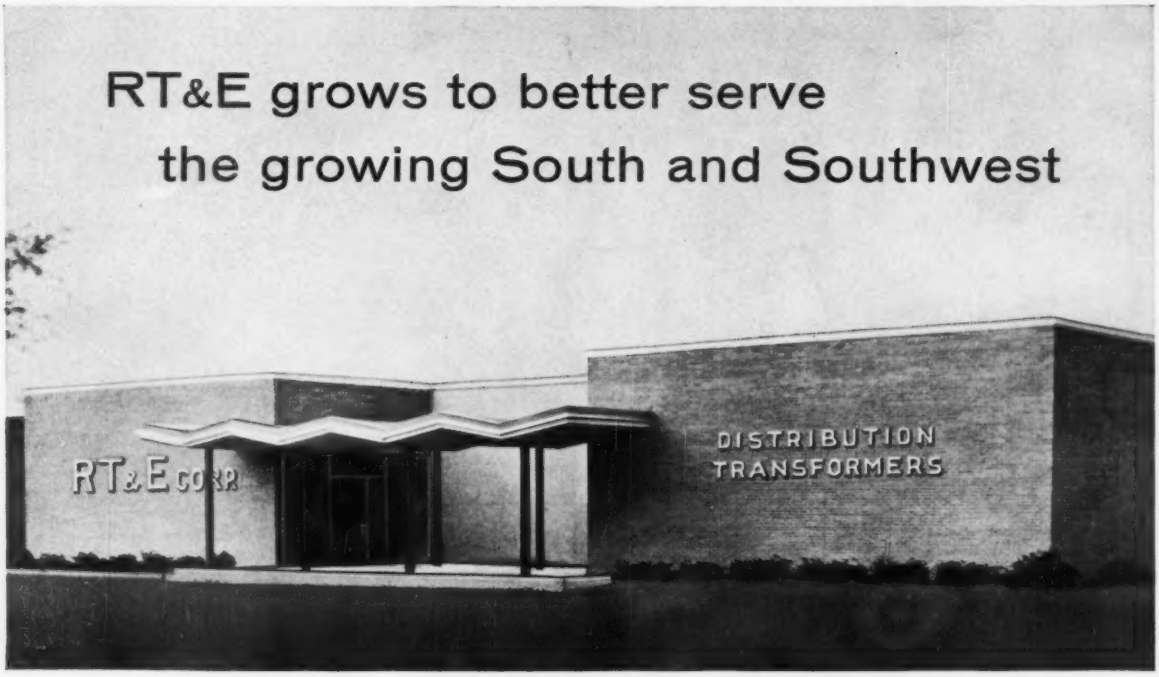
RT&E grows to better serve the growing South and Southwest



NOW IN OPERATION....

another new RT&E manufacturing plant—in Arlington, Texas!

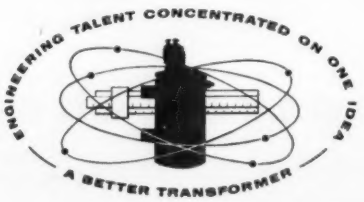
RT&E Corporation is proud to be the first major distribution transformer manufacturer to locate in the great South and Southwest.

Centered in the heart of this growing area, the Arlington, Texas plant with its latest, up-to-date equipment will provide immediate service and delivery for transformer users in seven states. In addition to manufacturing, Arlington adds another branch warehouse to RT&E's rapidly expanding nation-wide service network.

The new Arlington manufacturing plant, RT&E's third, is part of a carefully planned expansion program to provide the fastest service and delivery of the finest distribution transformers built.

RT&E Corporation

WAUKESHA, WISCONSIN
PORTLAND, OREGON
ARLINGTON, TEXAS



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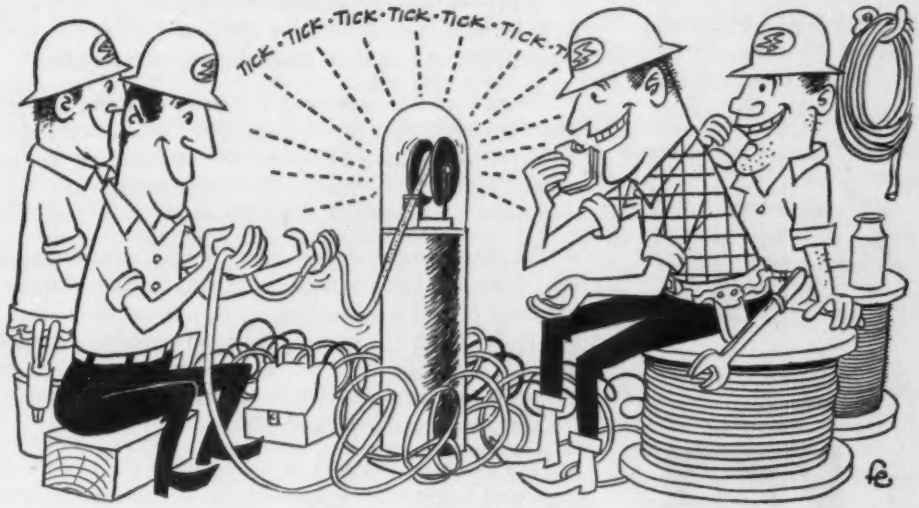


Plain Talk on Employee Thrift Plans

Report on
Employee Relations

No one yet has nailed down the precise value of a fringe benefit. There are too many intangibles involved. This is certainly the case with one of the most controversial benefits now being weighed by management—the employee thrift plan. Only a few have been set up, but many more are in the works. A study of 569 listed companies by the National Industrial Conference Board showed there were at least 79 in operation last year; seven in electric and gas utilities. What are the thrift plan's pros and cons? You'll find them outlined here in the form of a discussion between two utility officers. Supporting the plan is a man we call Joe L. Forrester, vp-personnel (his comments are preceded by a dot•). Against the plan is Harry P. Rejek, controller. The characters, of course, are ficticious. But the issues are real. Who is right?

• • •

"Joe, I just can't see the value of this thing. You want to start some kind of a thrift plan for our employees, so you suggest the company put 50¢ into an account for every dollar an employee contributes—just like that! And then you want to take this money and buy some of our stock for these people. Look, if people want to save, let them put their money in a bank. If they want to go into the market, they can do that too. But I'm not sure either is any of this company's business. People are better off when they take care of their own responsibilities. Let's not meddle with family finances."

• **"First of all Harry, there's no reason why we have to stipulate** that this cash be invested in company stock, although I think it would be best. But we have to do something with it, whether it goes into our stock, or government bonds, or into an investment trust. Are we meddling with family finances? I doubt it. No benefit program should take over a man's personal responsibilities. This plan wouldn't supplant personal savings, it would only *supplement* them. And I don't think it's coddling. It could strengthen everyone concerned; our employees, our work teams, the company itself, and even the community."

"Do you realize what this will cost us? At 50¢ on the dollar, this is a handout; just one more costly fringe benefit. I admit we need them, but only because everyone else has them too. There's absolutely no reason for us to take a lead in this direction. Let's keep the brakes on. You can't prove this would aid the company. Sure, you can talk all day about how employee benefits increase productivity, but you can't measure it in dollars. If you want to make this company more efficient, take this money and invest it in better supervision, or in better training, or put it in some kind of an incentive system."

• **"No service in this company is considered a 'handout,'** you know that, Harry. There are few human relationships that can't be improved, and that goes for our employee-management relations. But no company can maintain sound human relationships unless employees and management are both willing to do more than meets bare minimum requirements.

• "The cost seems to disturb you; I think you're overestimating it. Obviously, we'll draw a line somewhere. Let's say, the most that any employee can contribute is 6% of his base pay. That's about an average limit for these plans today. If we add 50¢ to every dollar an employee puts into the plan, we're only adding 3% to our wage and salary costs. Remember, over the last 10 years our hourly wage rates have gone up an average of 5.4% a year anyhow—about twice as much as this plan would cost us.

• "On the other hand, look at the benefits. First of all, we're encouraging our employees to get into the habit of periodic saving. We'd also be cementing our employee relations, especially if this money went into common stock. What better way is there to show an employee the advantages of free enterprise than to make him a stockholder—a member of the family? With a personal stake in the future of the company, our employees would be spreading goodwill everywhere in our service area. Imagine what this could mean when public opinion really counts most; let's say, the next time we go in for a rate increase.

• "Consider the impact on teamwork. Almost everyone wants to be recognized as an important contributor to a team. Our own work teams should reflect this principle. But often we find teamwork in a group whose goals are set only for themselves, not by management for the good of all. With a personal stake in the company, our employees would be more concerned with increasing efficiency and reducing waste, and I think they'd be more willing workers. And consider morale. The world of an employee is created on the job by his immediate supervisors. Ideally, our employees should feel their supervisors are backing them up, looking out for their interests as well as those of management. But it's important that employees feel the company is concerned about their welfare too, and benefits like this can be taken as strong evidence of just that."

"Sure, almost everyone would admit the company would get some benefit. How much is the question. I think this plan would cost more to operate than the very dubious improvement in employee-management relations would justify. And don't forget, your 3% cost figure doesn't include the expense of administering the plan. You'd be adding people to handle communications, and probably many more just to keep records—an account for almost every employee. This could be a very costly piece of overhead."

• **"The employees themselves could help administer the plan.** We could work out the details later. But I don't think cost is really the issue here. All I am saying is I think there would be long-term benefits for both the company and its employees. But, Harry, you can't go downstairs and measure it on your computer. We're talking about human relationships here. No company should ever start a new benefit program just because some officer thinks employees will like it and it looks like a good thing. But a plan like this, if well run, can be an integral part of the whole process by which management and employees get along. Frankly, it's sometimes a costly and highly inefficient process."

"Okay, you talk about increasing morale and teamwork. Certainly we would, a little. But this is a 'fair weather' plan, Joe. Let's suppose all our employees have stock in the company; we're doing well, paying good dividends and they're getting some nice price appreciation. But what happens when we have to lower the dividend, or if our stock starts declining on the market? Where will your employee interest go then? I'll give you a perfect example. Chas. Pfizer Co, Inc, used to have a stock plan for rank and file employees. But back in '53 and '54, their stock started declining with the market. It fell below the option price, and the employees were pulling out of the plan in droves."

• **"Sure, but Pfizer had a stock option plan.** We're talking here about a thrift plan, which is entirely different. Plenty of companies have these option plans for their employees. In fact, there are over 800 of them. It's perfectly obvious that an employee will pull out of an option plan if the stock drops below his option price. But with a thrift plan, we're always giving an employee, say, 50¢ on the dollar. Furthermore, if it's tied into a stock purchase, he's buying shares at current market price. There wouldn't be any reason for him to pull out of the plan because of the market. And if the market does worry some people, we can invest their money in government bonds.

• "And by the way, another advantage of this plan would be its effect on reducing labor turnover, which is very costly. I seriously believe that we'd be influencing more people to make a permanent career right here. Not just because of the plan itself, but because of the management attitude it demonstrates. It's even possible that with our contributions to the plan we could help hold down wage increases that would have been paid out otherwise."

"I can't buy that. In fact, I think wages would go up faster than before. Look what you're doing. You're forcing people to save by deducting savings from their paychecks. What happens? Now they have less to spend, so they turn around and ask for more, say a 6% increase, just to get back to their old income level. It's just human nature. And that only puts them back to where they started. Then they'll want another 5% or so to match the gains in take-home pay they've made every year in the past ten. You wouldn't hold down wage increases—you'd double them. And the company's contribution to the plan would be added on top of that."

• **"You have a point, Harry, but I think it's based on conjecture.** Workers have typically considered the value of fringe benefits in asking for increases. A review of the history of collective bargaining shows that, in the case of the unions at least. And while we're talking about costs again, let's not forget the cost of new financing. By selling stock to our employees through this plan we can cut out the sales expenses involved in a public offering of the same shares."

"Of course, there would be no sales fee. But you'd still have the cost of the plan to consider. At 50¢ to the dollar, this amounts to selling stock to employees at 33% below market value. Anyway, the amount of stock we'd sell our employees each year would be insignificant compared to the total volume of our new financing. Even if there might be savings, it's hard to see how they could compensate for the headaches involved with just running the plan.

"I'm glad you brought up the market, by the way. Think about it. I don't have to tell you that it goes up and down. But consider what would happen if it went *way* down, and *stayed* there for *quite* a while. How could this possibly do anything but damage our employee relations?"

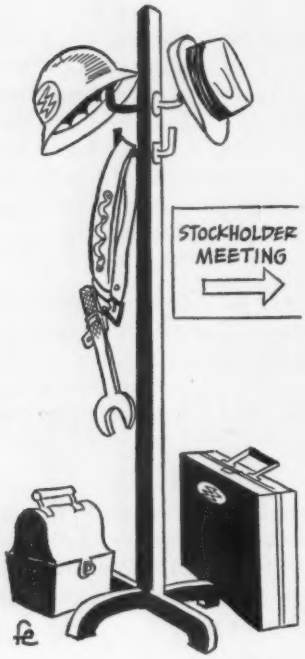
• **"I think, actually, that a sustained drop in the market** would have very little effect on our employee relations. Let's face it; most people are sophisticated enough to know stock prices rise and fall. But don't forget, the very fact that market prices *do* move is a powerful argument for buying stock in the first place.

• "Remember also that any contribution we make acts as a cushion to absorb most of the effect of a severe market drop. And the nature of the investing is

equally significant. Since an employee is putting in equal sums of money periodically through payroll deductions, he is dollar averaging. He automatically buys more shares when the market is low, which is good, and he buys fewer shares when the market is high, which is also good. Just suppose the price on our common stock fell 50% over a five year period. That would be an extremely big drop for an electric utility. An employee's loss on his total investment because of a 50% drop over a five year period would be only 12.5% with dollar averaging. But remember, one-third of his total investment was made by the company. So, even if the stock declined 50% in five years, he would still actually have about 30% more money in the thrift plan than he contributed himself. And that *doesn't* include the dividends he would have been receiving every quarter for five years."

"From the way you talk about dollar averaging, you infer the employees would be expected to hold onto their shares, and couldn't liquidate them at will. If that's the case, wouldn't an employee be pretty disgruntled if the market rises and then falls and he isn't able to sell at the top?"

• **"If he wants to second-guess the market,** he's probably stepping where he shouldn't. Certainly, we would need a liquidation clause for emergencies, such as a sickness or accident in the family. But I believe it's in the best, long-range interest of both the employees and the company if it is difficult to liquidate holdings on a whim."



"Well, suppose he had to liquidate his holdings in the worst possible circumstances. Suppose business was so bad he lost his job? This is the time he's going to need money the most. But his investment will be worth very little if the company is doing so badly that he has been layed off. Is it wise to put your 'job eggs' and 'nest eggs' all in one basket? If it's not smart, why urge someone else, particularly an employee, to do so?"

• **"Actually, the situation you're imagining is so remote** I believe we can rule it out in our discussion. First of all, the company has been growing steadily at about 8% a year for as long as I can remember, and we expect it to go right on growing at almost that pace for years to come. It's not likely that we'll be laying anyone off under these circumstances. And bad times or good, our customers still need light to read by, and a refrigerator, plus all the household gadgets that are considered necessities of life. We'll need employees to serve our customers, probably as many as now. And even if we went bankrupt, the system would simply pass into receivership, and the same employees would continue doing the same jobs as always."

"I think, though, that a very serious drawback would be the pressure it puts on people to join. Someday, a promotion comes along. Who gets it? Obviously, in the minds of our employees, the man who has shown the most interest and ability in the company. If someone isn't a member of the thrift plan, he'll be afraid this fact may be used against him. He may feel it's mandatory to join the plan. And when that happens, watch out. The first time anything goes wrong, say we lower the dividend or the market falls, this employee will logically place blame on the company."

• **"Actually, Harry, I think most companies realize this is a problem** with many of their employee benefits. The problem of coercion is present, but it's one we can iron out quite well, I think, in a meeting with our Foreman's Committee and one with union officers. That's how we've always anticipated and cleared up misunderstandings with our benefit programs in the past."

• • •

There you have the chief pros and cons. Who is right—Forrester or Rejek? Both have convincing arguments, but without detailed knowledge of their company no conclusion is possible. History shows that a remarkably good benefit program in one company may just as well be a Pandora's Box in another.

This one does the work of three

Chance Regulator By-Pass Switch does the work of 3 SPST Switches

and does it in automatically controlled sequence
1) by-passes the regulator, 2) disconnects both leads, and 3) interrupts the exciting currents when it's activated by a single, steady pull of a hookstick. We've designed this switch to meet *all* NEMA standards applicable to the SPST hookstick switches, including all short time current ratings. You get the security of *full* NEMA ratings, plus simplified and completely controlled operation.

You can see—this switch is rugged! It can withstand the mechanical and thermal shocks of high current surges. The blade-over-blade design eliminates eccentric forces on spacer insulators. Studs are cemented into the insulators with epoxy resin to provide strong, shock-resistant attachments to the castings. Contact engagement is secure in both closed and by-passed position. Another plus: it eliminates the possibility of human error; this disconnect cannot be opened under load, and the recloser can't be left by-passed in reclosing.

To wrap it up: this Regulator By-Pass Switch is more economical, easier to install, more reliable, less hazardous, and requires less space than a comparable installation of single-throw disconnects. It can be used with all regulators that can be set in neutral for switching. And, it's available in both 400 and 600 amp ratings, from 7.5 to 23 KV. Wouldn't you like complete information? Your Chance Man has it, or write us for Bulletin 280.

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CENTRALIA, MISSOURI
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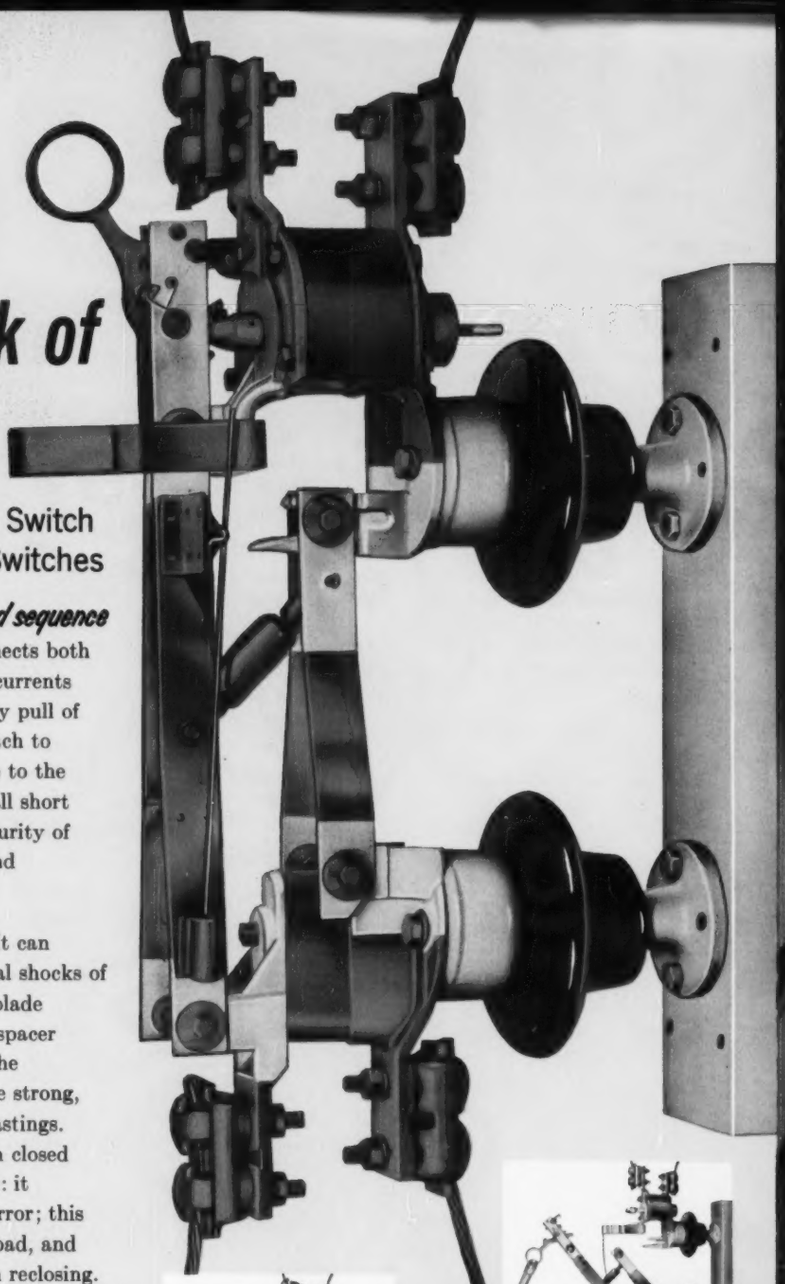
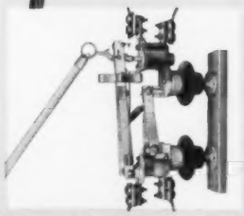
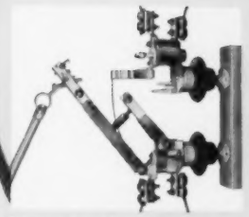
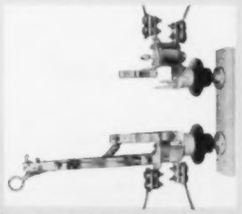




1. A pull on the ring disengages the blade latch . . . pulls the shunt bar into by-pass position between the shunt contacts (housed in the upper spacer insulator).



2. With the regulator by-passed, the dual blade continues downward travel, opening both disconnects. Arcing horn still maintains contact.



3. As the blade moves to full open position, snap-out arcing horn whips open to interrupt the exciting current. In reclosing, sequence is reversed.

HOW DO WE EASE THE RIGHT-OF-WAY SITUATION?

HOW CAN WE CUT INSTALLED COSTS?

HOW CAN WE SIMPLIFY SWITCH INSTALLATIONS?

HOW CAN WE SAVE ON MATERIAL COSTS?

HOW CAN WE GET GREATER OPERATING CONVENIENCE?

HOW CAN WE SATISFY PUBLIC DEMAND FOR BETTER APPEARANCE?

DO THOUGHTS LIKE THESE GIVE YOU INSOMNIA?

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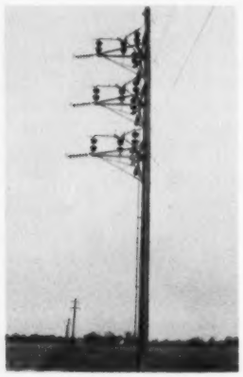

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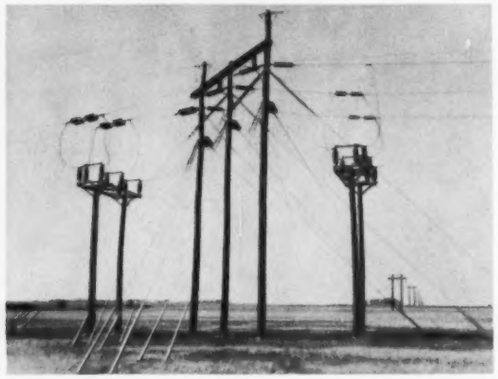


THE CHANCE GOABS IS NOW AVAILABLE IN A COMPLETE RANGE OF VOLTAGE AND CURRENT RATINGS TO MEET EVERY NORMAL REQUIREMENT: 2-Way & 3-Way, 400-600-1200 Amp ratings, 7.5 to 69 KV; 1-Way, 600-1200 Amp ratings, 34.5 to 69 KV.

1. **GREATER OPERATING CONVENIENCE** because control of switching is at *one* location. Traveling from switch to switch is eliminated. A "plus" anytime, one-spot switching is a real boon in bad weather.

2. **IMPROVED LINE APPEARANCE** because the Chance GOABS requires fewer equipment-carrying poles. Switch installations are clean and uncluttered. Your community relations are strengthened.

3. **MINIMUM RIGHT-OF-WAY REQUIREMENTS** because only one pole is needed to mount an entire unit for either single switches or 2-way and 3-way tap switching. You get phase-above-phase mounting on a single pole. No special structure is required.

4. **REDUCED LABOR & MATERIAL COSTS** because the GOABS welded, one-piece frame requires no assembly in the field, and the GOABS design has no superfluous insulators—only 3 stacks per phase for 2-way switching, 4 stacks per phase for 3-way switching. Handling is easier and quicker; installation is simpler.

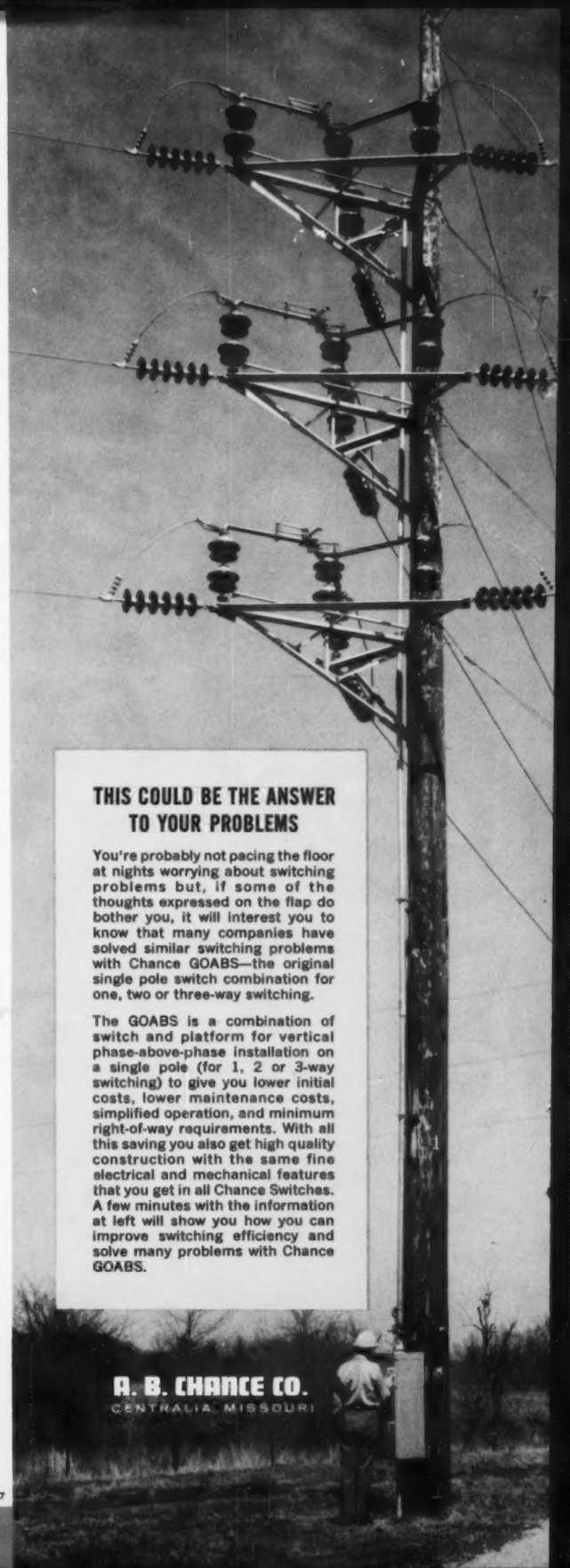
5. **SIMPLIFIED MULTIPLE SWITCH INSTALLATION** because only *one* location, only *one* pole, is required. Switches and frame for each phase are handled as a package. Balanced construction of lightweight aluminum frames aids hoisting up the pole.

6. **ELECTRICAL AND MECHANICAL RELIABILITY** because Chance GOABS meets all applicable AIEE and NEMA Standards. GOABS incorporate these electrical features: high-pressure, in-line contacts; braidless, non-parting hinge contacts; high-speed arcing horns. Mechanical features include maintenance-free bearings; use of bearings in control pin connections; a clean, rugged design that assures trouble-free operation.

40% TO 60% LIGHTER...

New welded structural aluminum frames make Chance GOABS easier to handle, easier to hoist, lighter on the pole.

CS60-17



THIS COULD BE THE ANSWER TO YOUR PROBLEMS

You're probably not pacing the floor at nights worrying about switching problems but, if some of the thoughts expressed on the flap do bother you, it will interest you to know that many companies have solved similar switching problems with Chance GOABS—the original single pole switch combination for one, two or three-way switching.

The GOABS is a combination of switch and platform for vertical phase-above-phase installation on a single pole (for 1, 2 or 3-way switching) to give you lower initial costs, lower maintenance costs, simplified operation, and minimum right-of-way requirements. With all this saving you also get high quality construction with the same fine electrical and mechanical features that you get in all Chance Switches. A few minutes with the information at left will show you how you can improve switching efficiency and solve many problems with Chance GOABS.

A. B. CHANCE CO.

CENTRALIA, MISSOURI

COMPARISON OF COSTS of group lamp replacement by a contractor and spot replacements by a utility is pointed out by L. J. Renas, Dayton Power & Light Co

Meetings Stress Cooking and Street Lighting

Industry meetings are still the best way for utilitymen to find out what is happening in other areas, and to grasp the tools to do a better selling job. Reports of two such meetings, one on street lighting, the other on commercial cooking, follow.

Product problems of the street lighting industry can be discussed right out in the open. This was proved at a Street Lighting Maintenance Conference sponsored last month by Mitchell Maintenance Co and attended by 42 representatives from utilities, consulting firms and manufacturers.

Frank discussions of equipment failures and difficulties in washing and maintaining street lights held the spotlight. The reasons for these problems then pointed the way to solutions.

Such discussions appeared to explode previous theories of many utility men that such open discussions should be taboo, or that operating people will not speak freely under such conditions. The open discussions also gave manufacturers' representatives a chance for rebuttal.

G. K. Harrington of Mitchell Maintenance discussed the washing and maintenance problems of many different types of street lighting fixtures. Improvement in light output of a fixture by washing was demonstrated with actual fixtures, with light meter readings showing a jump of 36% after a fixture had been washed.

Harrington also reported that the use of 6,000 and 10,000-lumen lamps in small fixtures results in too much heat and then explosion of the lamps. This makes fixture cleaning difficult, among other things, he said.

Careful attention to reporting failures on a street lighting system, and thorough analysis of these reports, will help determine what causes the failures, said F. N. Wones, Dayton Power & Light Co. DP&L started their reporting system by bringing in representatives of Mitchell Maintenance to teach street lighting maintenance men how to analyze and report failures.

Explains Breakage

Thermal shock is one of the major causes of breakage of glasswear in street lighting fixtures today, according to H. A. VanDusen of Line Material Industries. Thermal shock results when glass temperature is high and rain strikes the glass, he said. Research showed that temperatures are higher when dirt accumulates because that reduces the transmission of the heat through the glass, much the same as it reduces the transmission of light.

Glass temperature rise is less with incandescent lamps because of the large content of infrared which passes through the glass. As a comparison, 1.8 w of incandescent lighting causes the same heating of the glass as 1.0 w of mercury vapor lighting, according to VanDusen.

Other factors which affect thermal shock breakage include: Reflector design, clamping pressure, type of glass used, external prisms which affect the thermal shock resistance of glass, and putting too high a wattage in the fixture.

Cadmium sulphide photo-electric cells have given a much better account of themselves than have the vacuum tube type, reported D. R. Britow of Dayton Power & Light. And reports from other companies agreed with DP&L's experience. These reports indicated a failure rate for cadmium sulphide cells of 3½% per year or less, while the rate for tube-type photo-electric cells was around 20% per year.

Presenting cost curves to prove his point, John Young, Mitchell's Boston representative, said that the cost of light on the street is less when mercury vapor lamps are used than for any other type. A poll of operating companies showed group replacement schedules for mercury vapor lamps ranged from 6,000 burning hours to 14,000. Half reported 8,000-hr schedules.

(*Continued on page* 92)

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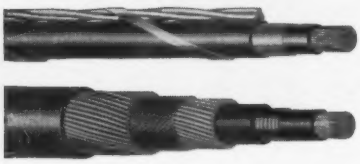

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(*Continued from page* 91)

Dayton Power & Light's L. J. Renas reported that group replacement of street lights by a contractor resulted in a $24,000 per year saving. For the 13,717 lamps on the system, this was almost $2 per lamp per year. Washing of fixtures at the time of lamp replacement reduces washing costs to a nominal figure, and maintenance costs are lower than ever thanks to the attention by the contractor.

Cooking Needs Razzle Dazzle

Put some "razzle-dazzle" into commercial cooking. "Razzle" is the building up to the "dazzle"—the market research, planning and preparing of sales programs, the training, the hard work and enthusiastic effort that makes the "dazzle" a success. "Dazzle" means to outshine the competition.

Architect of this "razzle-dazzle" approach to commercial electric cooking is W. L. Byrne, Ebasco Service Inc's assistant manager, sales marketing and public relations department, and he presented it to the 11th Annual Commercial Electric Cooking Conference in Chicago last month.

Harking back to the sales results brought out by *Electrical World's* Fifth Commercial Cooking Report (April 18, 1960, p 75) Byrne said that in spite of the encouraging figures, some utilities are de-emphasizing their promotion of cooking. But why? he asked. Commercial cooking has growing customer acceptance, good load factor, high power factor, and proven profitability.

He called for more research, planning, training, supervision, and "honest-to-gosh" selling. "The same old-fashioned techniques we've been using for years will not work in the Sixties," he said.

For the Sixties, Byrne proposed this six-step approach:

1. Find out what is going on out in the market place.

2. Apply fresh approaches to tried and proven methods of creating sales—find out what works and why, and then do more of it.

3. Throw off the taboos and inertia that were the natural outgrowth of a long-sustained seller's market.

(*Continued on page* 94)

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(*Continued from page 92*)

4. Elevate professional competence to the Number One spot in sales personnel.

5. Provide enough competent field supervision to assure that sales people get the job done.

6. Develop the most effective and efficient program possible.

"Commercial cooking specialists, design engineers for equipment companies, and equipment sales personnel would do well to have some actual experience in food preparation as part of their training," Rita Bedessem, director of the Hospital Division, Cooper Industrial Food Service Inc, said. "It is not sufficient for equipment to be well designed from an engineering standpoint. It must be practical."

She also called for better designed layouts in food-service outlets. "Equipment loses much of its efficiency unless incorporated into a well-designed layout," Miss Bedessem note. "Simplicity is the keynote."

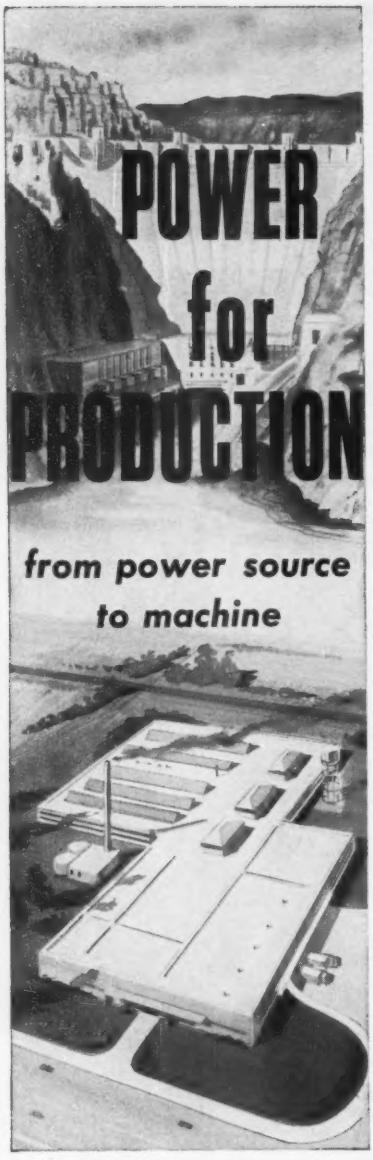
Some suggestions: Give careful consideration to work flow; eliminate cross traffic; stress sanitation; have equipment and work areas serve a multiple purpose; and use mobile equipment as a time and energy saver.

Finally, she warned, do not overequip. "You do yourself a tremendous disservice if you do. Do not sell by kws. The end result will be more volume because of more installations."

An old hand on an electric range, having used one since 1918, August Forster, head instructor at Chicago's Washburne Trade School, told of his experiences with electric cooking, and gave some advice.

"Remember," he said, "that selling new equipment to a customer does not mean your sale was a successful one merely because he may have paid cash. This sale should be followed up to see if the personnel are actually using the equipment to their full understanding of all its operations. Lack of following up your sale may cost you the next door sale."

Lack of understanding of equipment is causing machines to be left unused, Forster said. Those in charge should know how the equipment operates and demonstrate this clearly to new personnel.



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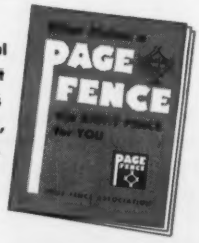
Helpful booklet describes fence styles, gates and, components



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Compare DEPENDABILITY! The "Transistomatic" unit contains no parts of any kind requiring regular replacement. Moreover, the entire unit is completely sealed—moisture-proof and watertight.

Compare GUARANTEES! The "Transistomatic" is so foolproof and trouble-free it carries a *lifetime guarantee!*

BEFORE YOU BUY ANY automatic precipitation control, be sure to get the complete "Transistomatic" story. See your nearest Western Precipitation representative for full details... or write, wire or phone for this "Transistomatic" booklet!

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DIVISION OF JOY MANUFACTURING COMPANY
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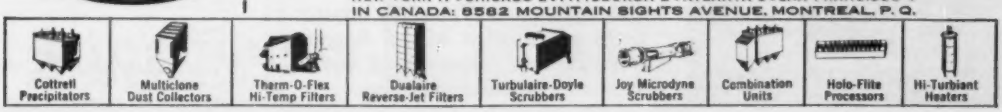
IN CANADA: 8562 MOUNTAIN SIGHTS AVENUE, MONTREAL, P. Q.



*Trademark

"Superforms* help me keep lines in service" ...DISTRIBUTION ENGINEER

"To me, the word 'Superformed' means a number of plus values:

"*Service continuity* to keep our customers satisfied . . . *low maintenance costs* . . . in short, *greater dependability* and *savings.*"

Everywhere, Distribution Engineers . . . *the men technically responsible for keeping customer lines in service* . . . acclaim Fanner Superforms.

A-1586A

FANNER Superformed with a "PROTECTIVE TWIST"

ARMOR RODS... Protect long-span T&D lines at supports

LINEGUARDS... Protect short-span T&D lines at supports

PATCH RODS... Repair damaged conductors

TAP ARMOR... Protects conductor at tapping points

FANNGRIPS... For dead-ending strands and conductors

FANNSPLICES... Join two ends of conductor wire

PLASTIC PRODUCTS... For conductor surface protection

FANNER
The Fanner Manufacturing Co.
Brookside Park—Cleveland 9, Ohio
Division of Textron, Inc.

Substations Grow in Steps

(*Continued from page 57*)

cally, except that the overhanging steel platform has been eliminated, resulting in the saving of 600 lb of steel. The high-voltage lightning arresters are on steel clips spaced for clearance from the drop-out of blown fuses. Bus connections to transformers are similar to those in the original design.

Low-voltage arresters are placed so that they can be safely replaced without de-energizing the transformer. Either a load-break switch, recloser, or breaker can be mounted on the low-voltage side of the transformer.

The four-column design is extremely flexible in providing space for a transformer bus, a regulated or unregulated bus, and a circuit transfer bus. Formerly, a circuit transfer was accomplished by means of a pole-mounted distribution tie switch outside the substation. A circuit-transfer bus with disconnecting switches now saves up to $500 and eliminates pole-mounted switches immediately outside the substation. Appearance is neater; operation simpler. Reclosers and low-voltage circuit lightning arresters are more accessible. Aluminum angle has simplified bus construction and connections at a considerable cost reduction over tubing.

Costs Comparable

Because of the many economies through the new design, total installed cost of a four-column substation is comparable with that of a two-column one. The design provides flexibility in converting a four-column structure from bus to circuit regulation. As there is more space for mounting equipment, operating procedures are safer and easier. Residential substations will be started as four-column substations, but industrial substations will continue to use the two-column structure, somewhat modified.

Preliminary estimates show savings of $100,000 for a completed 20 Mva distribution substation over the previous non-standardized design, primarily as a result of a thorough study of the application of each component. The study brought about a simplified wiring diagram and optimum placement of equipment and structural members.

STEAM POWER PLANTS
Starting, Testing, and Operation

Here is a complete guide to steam power plants—their physical set-up, their various components, and techniques for efficient operation. Follows a steam plant right from the design and construction stage through the steps preparatory to starting, organizing, personnel and facilities, starting up the new plant for the first time, development of operating procedures, and arranging test routines needed to keep the plant up to top economy. **By Charles Donald Swift, Mechanical Engineer, Ebasco Services, Inc. 490 pp., 95 illus., $11.50**

ENGINEERING MANUAL

Equal to six books in one! For quick answers to engineering problems, *including fields outside your own*—a practical reference of data and methods in architectural, chemical, civil, electrical, mechanical, and nuclear engineering. Covers most-needed essentials—everything from basic principles and fundamentals in each of the engineering fields right down to their applications—instantly available for quick, easy reference. **Prepared by a staff of specialists. Editor, R. H. Perry, Univ. of Oklahoma. 680 pp., 450 illus. and tables, $9.50**

MOTOR SELECTION AND APPLICATION

Just Published. Clearly and simply presents information necessary to determine the proper application of electrical motors for industrial service. Describes motor selection in terms of load characteristics, service requirements, space limitations, and safety and duty cycle requirements. Charts, tables, and illustrations relate these load variables to specific motor characteristics. **By Charles C. Libby, Fairbanks, Morse & Co., 480 pp., 200 illus., $13.50**

INDUSTRIAL POWER SYSTEMS HANDBOOK

Compiled by a staff of experts at General Electric, this comprehensive reference book explains up-to-date industrial power system engineering practices for engineers, technicians, plant managers, and all concerned with the planning and maintenance of electrical facilities for industrial plants or commercial buildings. Gives a wealth of examples, and includes a wide range of design data, largely from the experience of General Electric, presented in a simple, practical manner. **By Donald L. Beeman, Mgr., Ind. Power Sec., General Electric Co. 330 pp., 516 illus., $15.00**

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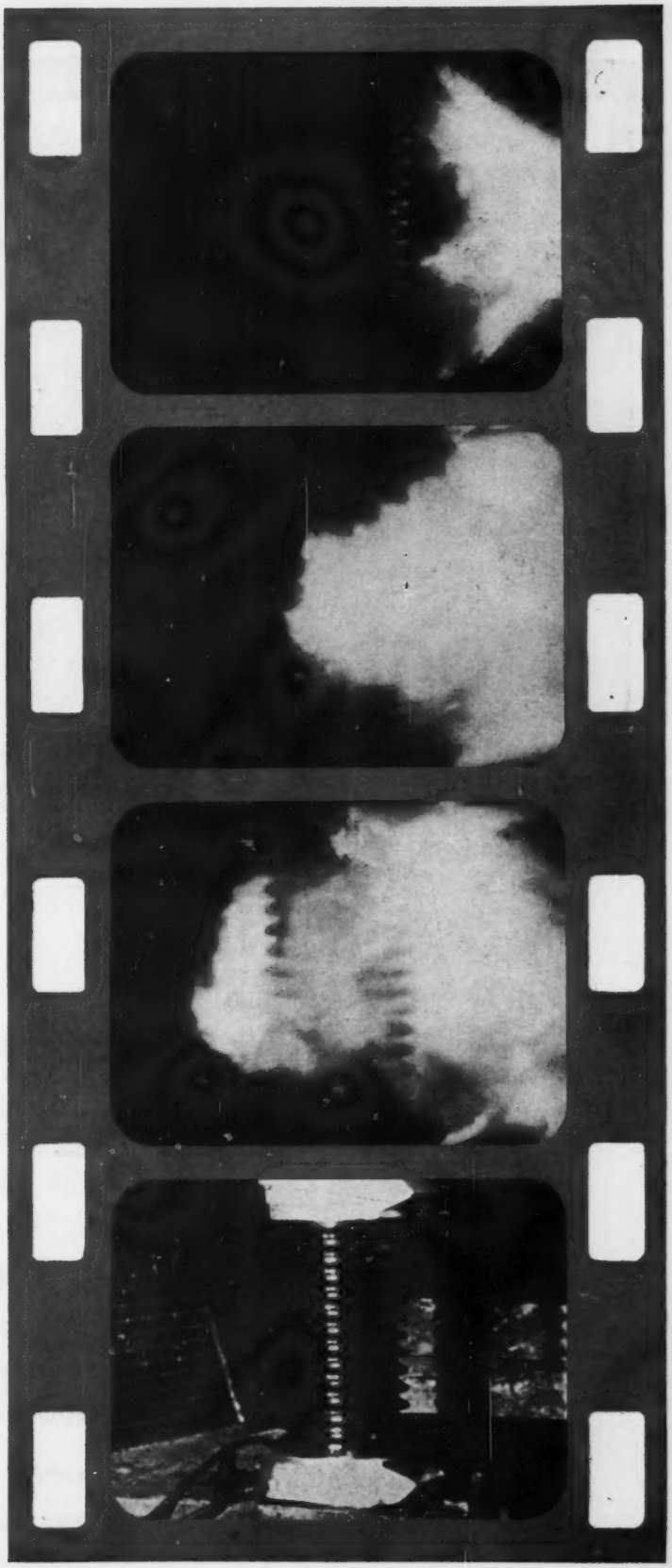
44,500 AMPS AND NO EXPLOSION



Films show pressure relief arc transfer operating on new SVS arrester

At the Westinghouse High Power Laboratory, the new SVS arrester was subjected to rigorous tests of its explosion-proof qualities. After the internal elements were deliberately damaged so that it could not clear, 44,500 rms symmetrical amperes were passed, and the new SVS remained physically intact.

This new pressure relief development on the Westinghouse SVS station-type lightning arrester provides unprecedented protection for your transformers and breakers.

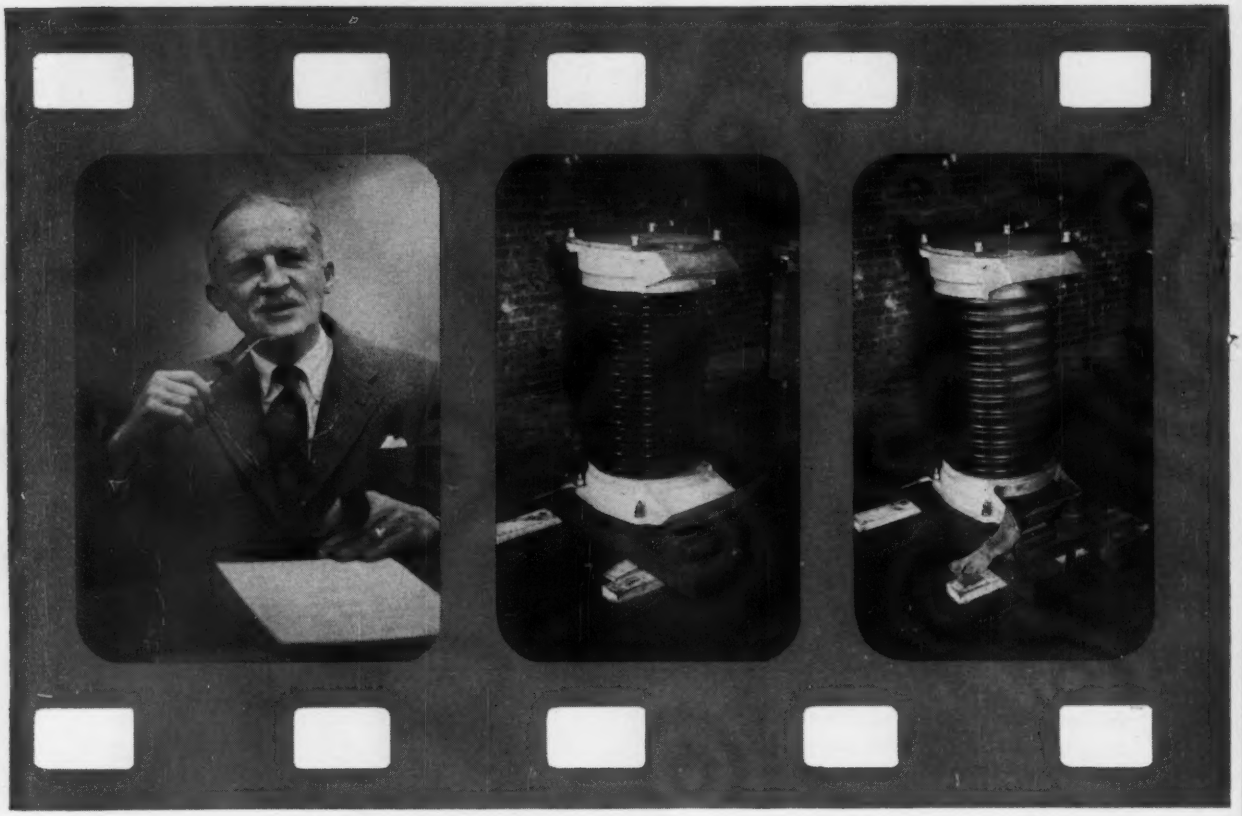
Continued development and testing of Westinghouse Autovalve® lightning arresters positively eliminates explosions if arresters are damaged or encounter severe overloads. Consequential damage to valuable equipment is eliminated. For more information about this new development, turn the page.

Film excerpts, from top to bottom, show the arrester at 30, 60 and 90 electrical degrees after the start of the fault current and intact immediately after the 10-cycle test.

J-60993-1

YOU CAN BE **SURE**... IF IT'S

Westinghouse



Edward Beck, lightning arrester research and design authority, reports—

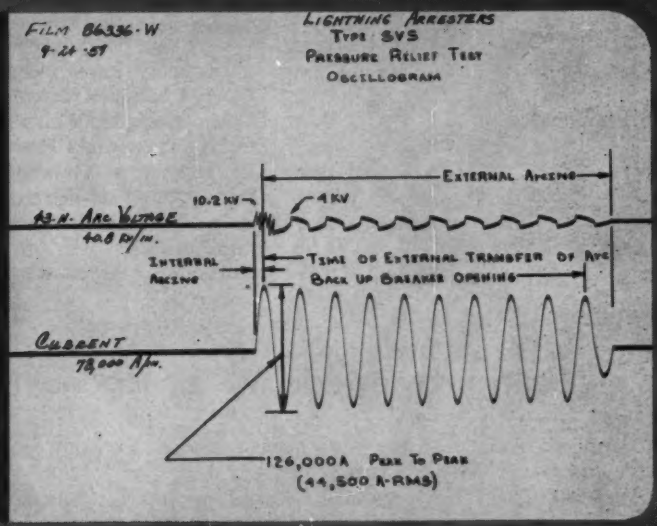
"DELIBERATELY DAMAGED, NEW WESTINGHOUSE SVS ARRESTER IS TESTED AT 44,500 AMPS WITH NO EXPLOSION!"

"Occasional lightning arrester damage cannot be prevented entirely—**but explosions can,** with Westinghouse Autovalve lightning arresters.

J-60993-2

AT LEFT
a pre-failed arrester before and after the test.

AT RIGHT
an oscillogram made during the test. Note the test current of 44,500 amps. Within the first quarter of a cycle, the diaphragms broke and the arc transferred. Current continued for 10 cycles with no arrester explosion.



"The latest in this series of advanced, explosion-proof arresters is the 44,500-amp SVS station design—the highest fault rated arrester available.

"At Westinghouse, we have just completed fascinating tests on the new SVS proving it to be explosion-proof. To simulate actual service conditions, the gaps were shorted and the blocks were pre-punctured making certain the arrester would not interrupt the fault current.

"As shown on the oscillogram, the fault current was 44,500 rms symmetrical amps. The new SVS quickly relieved the tremendous internal pressure by switching the arc from the inside to the outside—a patented Westinghouse method of preventing arrester explosion. After the circuit was reclosed, the arrester remained intact. At the end of the tests, only the exterior porcelain was blackened and the diaphragms ruptured."

FOR MORE INFORMATION on the outstanding protection offered by the new 44,500-amp SVS lightning arrester, call your nearest Westinghouse salesman and ask him to show you the "Station Arrester Test Report" film.

J-60993-3

YOU CAN BE SURE...IF IT'S **Westinghouse**

(Tune in Westinghouse—CBS TV–Radio Coverage, Presidential Convention July 10–29)

Penelec Names Bovier a VP

Pennsylvania Electric Co has nominated Ralph F. Bovier to the post of vice president in charge of the technical department. In his new position he will have over-all supervision of the generation, transmission and distribution of electricity in the 31 counties served by Penelec.

Bovier, who succeeded Walter C. Sontum (retired), began his utility career with the Northern Pennsylvania Power Co in 1932. He served as a surveyor and then a field engineer at Towanda until 1940. That year he became chief engineer. The company later merged with Penelec, and Bovier moved to Johnstown in 1954 as system engineer. Two years later he was promoted to superintendent of transmission.

For the past year he had been assistant to the vice president-technical.

Weatherby Made VP at Rochester G&E

Harold S. Weatherby has been made vice president and controller of the Rochester Gas & Electric Corp.

Paul W. Briggs has been named secretary and the following have been designated assistant vice presidents: George H. Fiedler, general superintendent of Electric & Steam Divisions; Frederick J. Pfluke, general superintendent, Gas Division; Francis E. Drake Jr, manager, rate and economic research department; and Schuyler F. Baldwin, director of public relations.

Weatherby joined Rochester G&E in 1927 as a clerk in the general accounting department. After holding several other posts, he became assistant secretary in 1947. He was then named assistant secretary and superintendent of general accounting in 1951. In 1957 he was made secretary and controller.

McCLANAHAN HARTT FRANK GATES

McClanahan Elected President of Middle West Service Co

Rodman McClanahan has been elected president of Middle West Service Co. He succeeds Jay Samuel Hartt who was elected chairman of the board.

McClanahan had been executive vice president. A certified public accountant, he has spent the past 30 years in the public utility field. For eight years he was vice president of United Public Utilities Co, actively engaged in the operation of a number of utility companies. He joined Middle West in 1930, became vice president in 1948, and executive vice president in 1953.

George Frank, formerly with Emerson Consultants Inc, of New York, was elected a vice president. He will head a new industrial department. Elmer Gates, manager of the rate department, was also elected a vice president.

Hartt has been in consulting engineering for more than 40 years. In 1955 his private firm merged with

(*Continued on page* 102)

For light duty or heavy . . . Elkonite® contacts add reliability

Dependable performance and long life in molded-case circuit breakers demand the utmost contact reliability—even under severe short-circuit arcing. That's why it pays to specify Elkonite contacts.

Utilizing specialized Mallory powder metallurgy techniques and contact know-how, Elkonite combines the arc resistance of refractory metals with those having high electrical and thermal conductivity. Mallory contact engineers work with apparatus designers to determine the exact qualities required for each application—the right combination of conductivity, arc erosion resistance, mechanical strength and hardness. Here are the same Elkonite properties found in contacts for giant, heavy-duty circuit breakers—but in a combination designed to produce optimum performance in this application.

The advanced processing techniques we use to control all phases of manufacturing assure adherence to rigid standards. This control pays off in contacts with extra quality and extra long life, extra value. To make sure you get top performance for your investment, *insist* on Elkonite contacts in the apparatus you buy.

From generator to user,
Mallory contacts serve the nation's utilities . . .

Mallory Metallurgical Co., Indianapolis 6, Ind.
a division of

P.R. MALLORY & CO. Inc.
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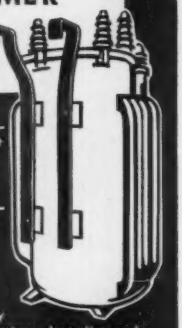
THIEL

TRANSFORMER HANGERS



MODEL	C-1	C-3
Trans-former	75-100 KVA Single-Phase	75-112½ KVA Three-Phase
Weight	46 lbs.	100 lbs.

Thiel Hangers are made to NEMA specifications. Heavy gauge steel construction, hot-dip galvanized for dependable service and long life. Two styles complete with galvanized bolts and nuts stocked for immediate shipment.

HANGER KICKERS
Sizes to fit T-Type hangers.

T-TYPE HANGERS
Two sizes, for 3-50 KVA 1-Phase and 9-45 KVA 3-Phase transformers.

THIEL TOOL & ENGINEERING CO., INC.
1417 N. MARKET ST. LOUIS 6, MO.

McClanahan Elected (*Continued from page* 100)

Middle West of which he became president in 1957.

Frank has had more than 20 years' experience in methods planning, work study and improvment, cost control, production control, fabrication and assembly. He had been a vice president and director of Emerson Consultants Inc for the past 10 years.

Gates spent six years as utility engineer for the California Public Utilities Commission before joining Middle West in 1951.

PERSONAL BRIEFS

W. G. Shurgar Jr has been named superintendent for Arkansas Power & Light Co's new 325,000-kw steam electric station now under construction in Helena. Replacing him as superintendent of the Hamilton Moses Steam Electric Station at Forrest City is **Norris M. Walthall,** and **John W. Anderson Jr** replaces Walthall as assistant superintendent of the Lynch plant.

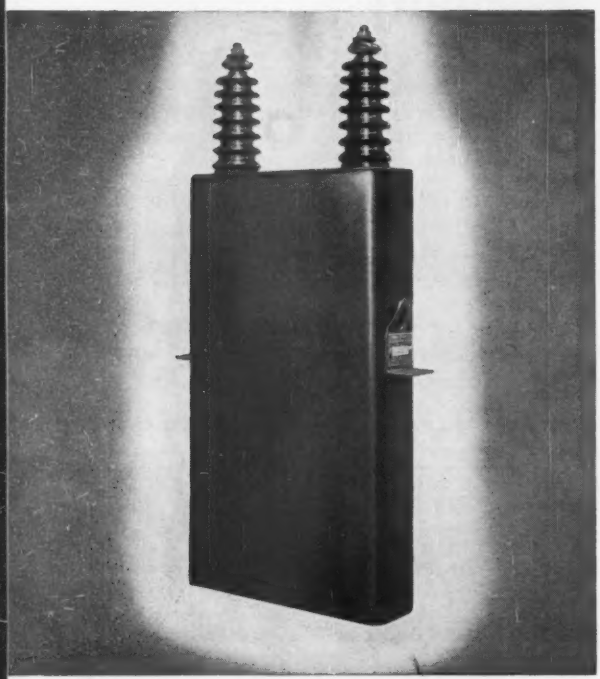
J. C. Happenny, vice president-commercial, Central Illinois Public Service, has become a director.

South Carolina Electric & Gas Co has promoted **Curtis L. Rye** to district engineer at Columbia. He has been succeeded as district engineer at North by **Norman L. Harvey.**

Mississippi Power & Light Co has placed the industrial and development activities under the general supervision of Vice President **Les M. Taylor,** and **J. J. Power** has been designated general sales manager, with all marketing and sales activities under his supervision.

Robert E. Waldo has become assistant treasurer of Columbus & Southern Ohio Electric Co.

G-E "COMPACT ISOKRAFT 50" CAPACITORS OFFER*



*Trademark of General Electric Co.

900 KVARS AT

General Electric's new "COMPACT ISOKRAFT 50" capacitor represents the lightest and most compact 50-kvar unit available. And because of these benefits, higher rated, lighter capacitor equipments can be installed in locations where weight and size are limiting factors.

Single-row capacitor equipments offer the cumulative weight reduction of these new, 4-inch-thick, 82-pound, 50-kvar units. They weigh less and, installed, have less extension beyond the pole. Easier, less expensive installation and improved appearance on the pole result.

"COMPACT ISOKRAFT 50" capacitors help make available a 900-kvar single-row equipment that weighs less than the first 600-kvar equipment introduced in 1956. And the 900 kvars fit into an

Otto K. Mangum has been named project manager of the Parker-Davis Project in Phoenix, Ariz. He succeeds **Erick A. Benson,** who was transferred to the Bureau of Reclamation's Colorado Basin Project in Washington as power supervisor of Grand Coulee Dam.

James V. Barker has become system superintendent of Virginia Electric & Power Co. He succeeds **L. L. Eley Jr,** who has been promoted to manager of the engineering and construction department.

Raytheon Co has named **Marvin C. Lewis** product manager of commercial marketing research.

Federal Pacific Electric Co has named **Howard Dale Langley** marketing manager-motor control.

R. G. Greener has been named field engineer for Line Material Industries.

Marshall A. Williams has become director of a new department for marketing at Simplex Wire & Cable Co. Vice President **Philip R. Morss** has retired.

Melvin L. Manning, dean of engineering, South Dakota State College, has been retained by Delta-Star Electric Division of H. K. Porter Co, Inc, as a transformer consultant. **Norman E. Shipley** has been appointed sales manager for the Thomas Works.

Keasbey & Mattison's Industrial Division has appointed **C. Fred Workman** merchandising manager, insulation sales.

Worthington Corp has made **C. F. Hendrie** utility consultant for steam power products, and **J. R. Matullo,** manager of steam power sales.

RT&E Corp has named **Raymond M. Carlson** advertising and sales promotion manager.

William J. Healey has retired as key account sales engineer in the New York district office of Weston Instruments Division, Daystrom, Inc.

SHAW-PERKINS
COOLING
RADIATORS
. . . properly designed to cool power and distribution transformers
Designed and built by the pioneers and specialists in economical, dependable self-cooling methods. Sizes and models for any make transformer. Valves, flanges, elbows available. Transformer tanks built to customer's design.
Write for full information.
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MANUFACTURED BY
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600-KVAR WEIGHT

equipment that extends only 5 inches more beyond the pole than a 600-kvar equipment with superseded 50-kvar units.

And further reducing costs, self-protecting aluminum racks and corrosion-resistant stainless-steel capacitor cases eliminate the need for periodic protective paint maintenance.

For more complete information contact your General Electric Apparatus Sales Representative, or write for Bulletin GEA-7061, General Electric Co., Section 445-32, Schenectady 5, N. Y.

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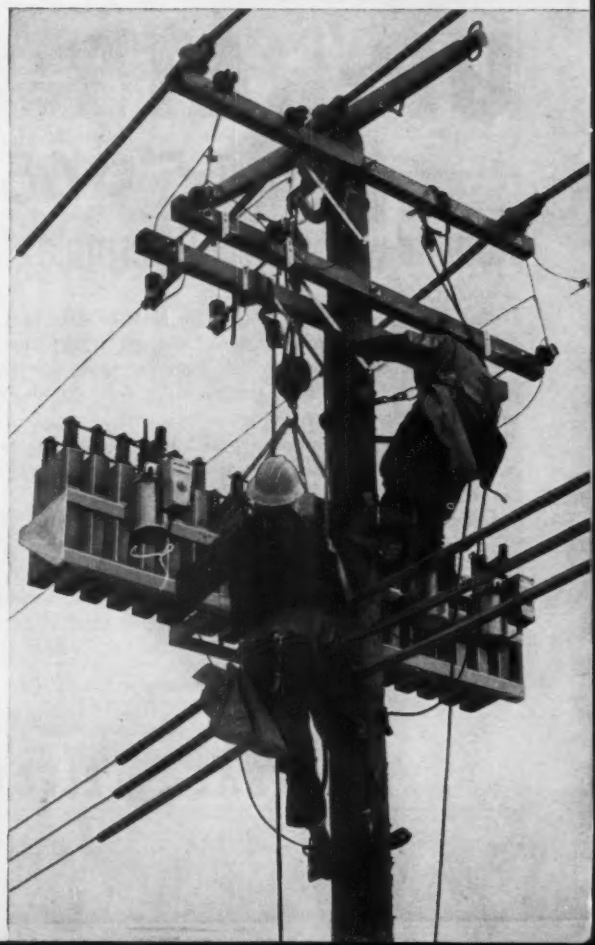
GENERAL ELECTRIC



UP-RATE NOW

to 55°◉65°

Rebuild with new G-E Permalex* core and coils

Now, rebuild distribution transformers to take advantage of 55° ◉ 65° dual-kva ratings—today's most modern transformer development. An old 5-kva unit housed in a 12-inch diameter tank, for instance, can be rebuilt to a basic rating of 15 kva. Additionally, General Electric 55° ◉ 65° dual-kva units give you 12 percent more kva with a supplementary rating—based on 65C peak load temperature rise. After rebuilding with G-E Permalex core and coils, your transformers are rated at 16.8 kva—a total increase of 335 percent.

Rebuilt distribution transformers offer you real dollar savings plus new reliability with a new transformer warranty. Have your obsolete or burned-out units rebuilt by one of General Electric's 55 Apparatus Service Shops. Or have your own shop install these up-to-date G-E transformer features.

For more information see your General Electric Service Shop representative or G-E Sales Engineer. General Electric Co., Schenectady 5, N. Y. 485-02

* Trade-mark of G.E. Co.

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Specialists in Financing
Accounting and other Operations
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Nation Wide Mapping Services
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EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

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Send New Advertisements to Classified Advertising Div. of Electrical World, P. O. Box 12, N. Y. 36, N. Y.

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Utility Manager; overseas location. Minimum of 10 years experience in systems involving generation, transmission & distribution. Will head 3 man team, including American Accountant and operation engineer. This team will coordinate contract operators of system, supervise collecting, train local personnel, report to Power Authority Board. Please submit complete resume and salary requirements to P-4508, Electrical World.

Wanted—Electrical distribution construction engineer for assignment in Liberia, West Africa. Man with extensive practical experience in overhead line construction and familiar with sub-stations, switchgear and meters, and cable work. Must be capable of training personnel. Reply in detail to P-4569, Electrical World.

SELLING OPPORTUNITY AVAILABLE

Representative wanted for manufacturer of street lighting equipment pole line specialties. Full particulars. RW-9821, Electrical World.

SELLING OPPORTUNITY WANTED

Canadian Agent desires additional lines, central Ontario location, national contacts in Utility, Industrial, OEM markets seeks distribution construction and maintenance materials and components. RA-4604, Electrical World.

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3—1000 kva Westinghouse, 1/13800/480
3—1000 kva Westinghouse, 1/13800/2400/4160Y
3—1000 kva Standard, 1/44000/8900
3—1000 kva Standard, 1/69000/4160Y/2400
3—1000 kva Standard, 1/34400/480
3— 833 kva Allis Chalmers 1/60/12,000—480
3— 200 kva Westinghouse, 4800—240x480
3— 100 kva G.E., 2400/4160Y—120x240
3— 75 kva G.E., 2400/4160Y—120x240

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Type V2A, V3A, LC2A,
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Rapidly expanding Southwestern utility offers excellent opportunity for an equipment journeyman under age 40 to be assigned substation maintenance. Applicants should be thoroughly familiar with (6 to 8 years experience) transmission and distribution switching operations, maintenance of oil and air circuit breakers (5000—115000 Volt), substation transformers, bushings, tap changers and cooling equipment as well as auxiliary relays and batteries. Address complete resume of experience and education to: Public Service Company of New Mexico, P. O. Box 1360, Albuquerque, New Mexico. Attention: Mr. W. L. Hunt.

ELECTRICAL ENGINEERS

CONSUMERS POWER COMPANY, a Growing Utility company serving the lower Michigan area, has positions available for qualified, experienced engineers in the electric engineering department. These positions are in substation design, overhead and underground lines and system planning.

CONSUMERS POWER COMPANY Offers Good Salaries and excellent opportunity for advancement. Liberal hospitalization and life insurance policies, educational assistance, pension plan, an excellent sick leave program and paid vacation plan are but a few of the fine employee benefits offered to you. Here is your opportunity to work & progress with an expanding utility company. Send a resume of your education & experience to Mr. L. B. Johnson,

CONSUMERS POWER CO.,
212 W. Michigan Ave., Jackson, Michigan

TRANSMISSION LINE MAINTENANCE SUPTS (2)

5 years minimum experience in supervisory capacity in construction and/or maintenance of high voltage transmission lines including hot line work at 230 KV or above. In addition to mobile equipment must be familiar with microwave & radio relay & communication systems.

Permanent positions with new organization. Will be responsible for recruiting & training line maintenance crew and for developing & maintaining up to date continuous maintenance program. Salary commensurate with qualifications. Location Western New York State. Appointments expected Oct. 1, 1960 & March 1, 1961.

Send detailed resume

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ARWA Seminar Highlights Academic Training

Education, professional status and the importance of liaison between utilities, highway departments and other agencies seemed to be of prime importance to right-of-way men at the recent sixth annual seminar in Washington, D. C., of the American Right-of-Way Assn.

ARWA is striving for more recognition in college curricula at the very time that specialized training is becoming unpopular with overcrowded educational institutions. The problems inherent in this situation were discussed by David R. Levin, chief of the Highway & Land Administration, Bureau of Public Roads, Washington, D. C., and Dr John T. Bonner of Ohio State University.

At the bottom of the problem is the definition of what a right-of-way man is. He is neither engineer, real estate agent, public relations expert, area development consultant or appraiser—and yet he must be each of these to some extent. What kind of an academic program would fit?

Most of the courses presently available are real estate oriented, which covers only part of the field. Levin said there is probably not a college in the country where a person can take a course in right-of-way acquisition. His recommended curriculum would consist of:

- Elementary civil engineering;
- Highway, utility or railroad planning;
- Basic design, including drainage problems, plan reading and other fundamentals;
- Appraising—dealing with specifics and not just general practices. This would give knowledge on determining the value of access rights and other problems of economics. It would also include title search and examination, and property management.
- Economic impact of highways and urban development;
- Communications skills.

Dr Bonner's ideas for building an academic training ground begin with establishing liaison with education committees of related organizations, or those with similar interests, to bolster the ranks (about 7,500) of AWRA. There are about 75,000 people directly engaged in right-of-way work in the nation now.

A logical place to begin, according to Dr Bonner, is to get educational institutions to offer specialized evening courses, and perhaps have right-of-way professionals offer their services as teachers. From this point, if there is sufficient interest, a full credit curriculum can be built.

Both speakers agreed that formal, specific education provides the route to the degree of professionalism ARWA members are seeking.

The ARWA utilities section, under the leadership of Cullen Coates of Pacific Gas & Electric Co, is striving to eliminate some duplication of effort in basic studies occuring across the nation. Coates said the section's approach to this is to attempt to anticipate the problems of the future and assign their analysis to specific groups or individuals.

As an example, Coates mentioned that electric utilities will be serving twice the present load ten years from now, and right-of-way acquisition will rise simultaneously. Experience or knowledge gained by one group in dealing with underground distribution, right-of-way through expensive residential or commercial areas, etc., can be beneficial to many if it is disseminated.

Clifton W. Enfield presented a progress report on the federal highway program. He said 7,570 miles of the ultimate 41,000 have been constructed; 4,770 are under construction, and right-of-way acquisition of 18,370 miles is underway.

New chairman of ARWA is Daniel W. Rosencrans, vice president of Title Insurance & Trust Co, Los Angeles, who formerly headed up ARWA Region 1. New Region 1 chairman is Don Wilcox, Bellvue, Wash. Roy A. Drobeck, Commonwealth Edison Co, Chicago, is new chairman of Region 5. He succeeds Marvin J. Evans, retired. Hugh McDaniel, Northern States Power Co, Minneapolis, takes over the Region 3 chairmanship from retiring Homer R. Swift.

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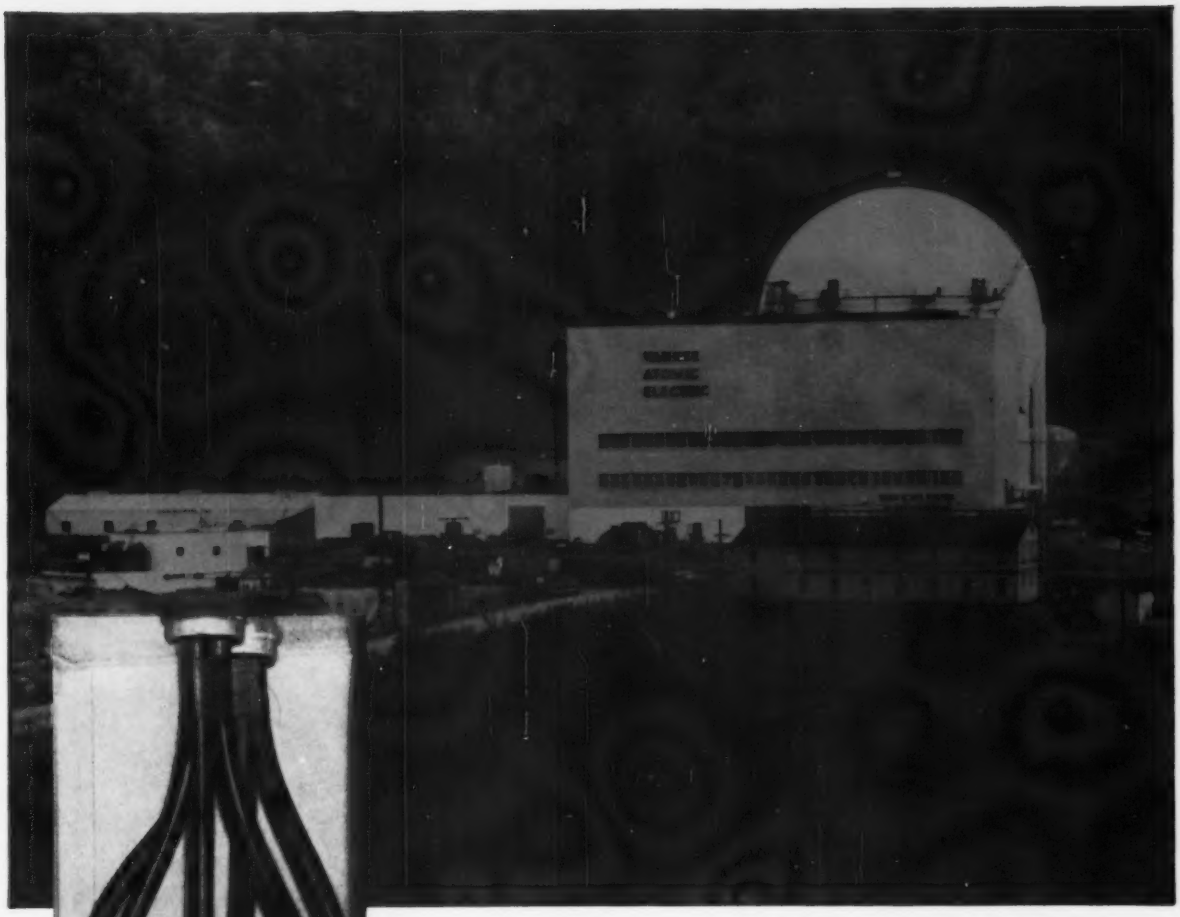

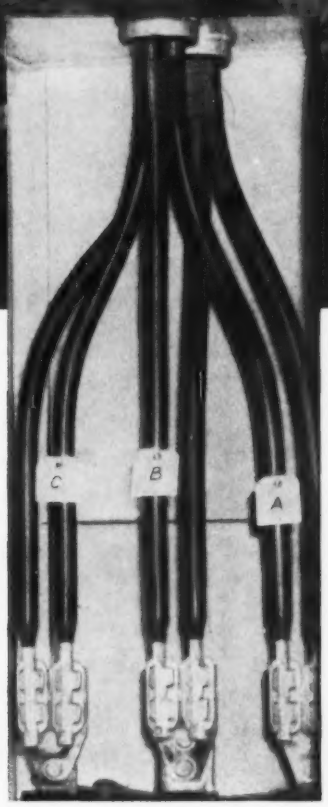

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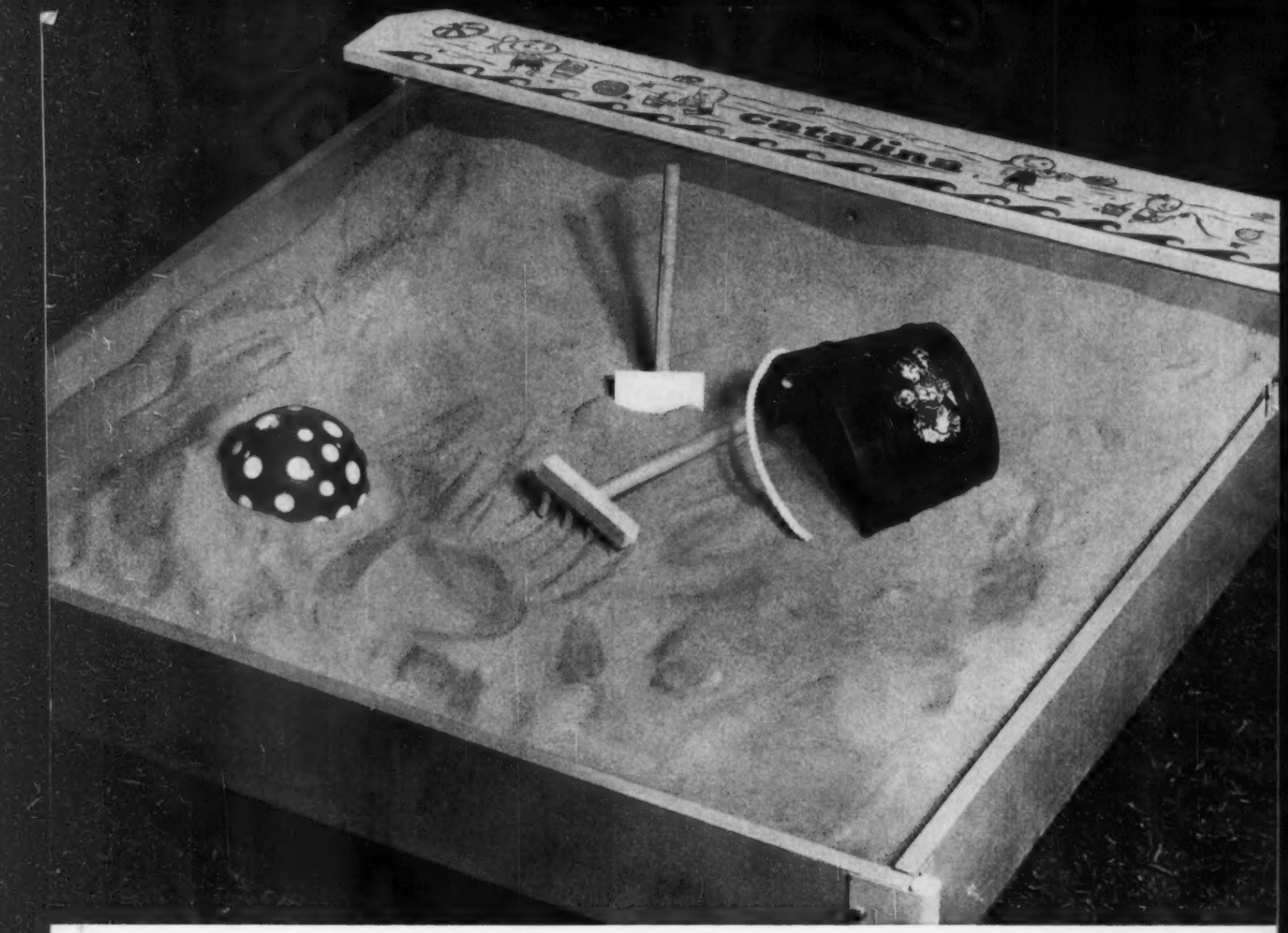

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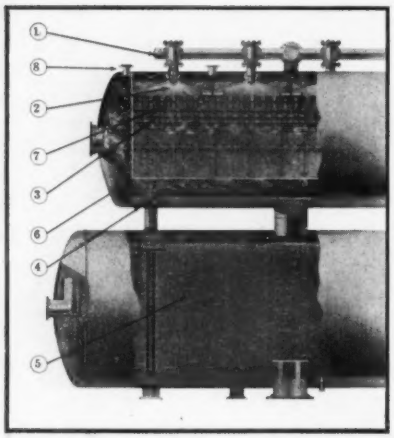

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